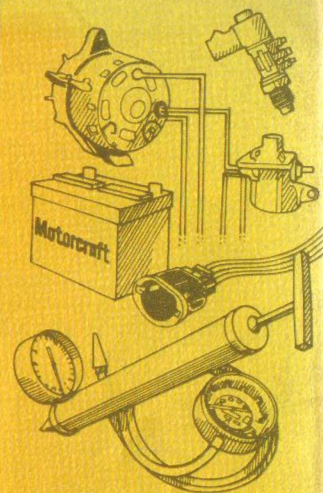
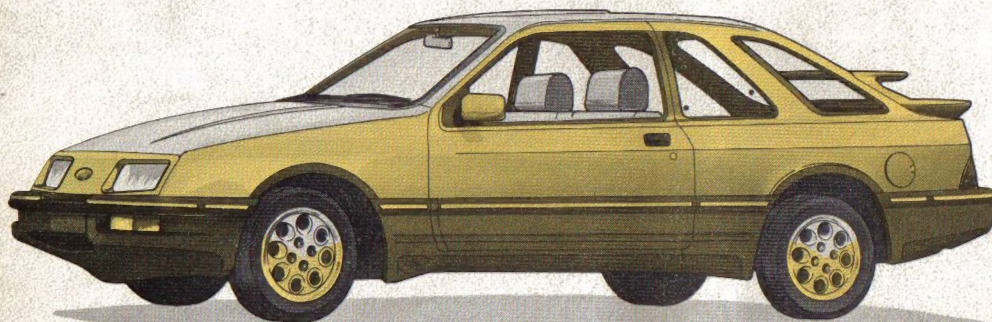


1985 MERKUR XR4Ti

1985 MERKUR XR4Ti



Electrical & Vacuum Trouble- Shooting Manual



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IMPORTANT SAFETY NOTICE

Appropriate service methods and proper repair procedures are essential for the safe, reliable operation of all motor vehicles, as well as the personal safety of the individual doing the work. This Manual provides general directions for accomplishing service and repair work with tested, effective techniques. Following them will help assure reliability.

There are numerous variations in procedures, techniques, tools and parts for servicing vehicles, as well as in the skill of the individual doing the work. This Manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this Manual must first establish that he compromises neither his personal safety nor the vehicle integrity by his choice of methods, tools or parts.

The purpose of this manual is to show electrical and vacuum circuits of these vehicles in a clear and simple fashion to make troubleshooting easier. With each circuit is a description of *How the Circuit Works* and some *Troubleshooting Hints*. A *Component Location* chart lists components, connectors, and references to pictures in the manual.

Wiring Diagrams give a schematic picture of when and how the circuit is powered, what the current path is to circuit components, and how the circuit is grounded. Each circuit component is named (underlined titles). Wire and connector colors are listed (standard Ford color abbreviations are used):

COLOR ABBREVIATIONS

BL	Blue	N	Natural
BK	Black	O	Orange
BR	Brown	PK	Pink
DB	Dark Blue	P	Purple
DG	Dark Green	R	Red
GR	Green	T	Tan
GY	Gray	W	White
LB	Light Blue	Y	Yellow
LG	Light Green		

Where two colors are shown for a wire, the first color is the basic color of the wire. The second color is the dot, hash, or stripe marking. If **D** or **H** is given, the second color is dots or hash marks. If there is no letter after the second color, the wire has a stripe.

For Example:

BR/O is a brown wire with an orange stripe.

R/Y D is a red wire with yellow dots.

BK/W H is a black wire with white hash marks.

Connector end views of switches and other components are shown to help with bench testing. The views show the harness wire colors that connect to the mating terminals. Connector colors and locations are shown in the *Component Location* chart. Two-color listings indicate separate colors for each connector half.

Components which work together are shown together. For example, all electrical components used in any circuit are shown on one diagram. The circuit breaker or fuse is shown at the top of the page. All wires, connectors, splices, switches, and motors are shown in the flow of current to ground at the bottom of the page. Notes are included which describe how switches and other components work. If a component is used in several different circuits, it is shown in several places. For example, the main **Light Switch** is an electrical part of many circuits and is repeated on many pages. In some cases, however, a component may seem by its name to belong on a page where it has no electrical connection. For example, **Radio Illumination** is electrically part of **Instrument Illumination**. Since it has no electrical connection at all with the actual **Radio** circuit, it is not shown on the **Radio** page.

Troubleshooting Hints point the technician in a general direction, but are not intended as a step-by-step procedure. Ignition troubleshooting is an exception to this. It includes a step-by-step procedure of basic quick checks to locate some of the more common **Ignition System** problems. Read the Shop Manual for more detailed repair procedures.

The **Grounds** pages show detailed views of multiple component ground points. This is useful

for checking interconnections among the ground circuits of different diagrams.

Notes, Cautions, and Warnings appear in boxes on text pages and contain important vehicle and mechanic safety information.

Notes give added information to help complete a particular procedure. Cautions are included to prevent making an error that could damage the vehicle. Warnings highlight areas where carelessness can cause personal injury. The following list contains some general **Warnings** that should be followed when working on a vehicle.

- Always wear safety glasses for eye protection.
- Use safety stands whenever a procedure requires being under a vehicle.
- Be sure that the **Ignition Switch** is always in the OFF position, unless otherwise required by the procedure.
- Set the parking brake when working on any vehicle. An automatic transmission should be in PARK. A manual transmission should be in NEUTRAL.
- Operate the engine only in a well-ventilated area to avoid the danger of carbon monoxide.
- Keep away from moving parts when the engine is running, especially the fan and belts.
- To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe, catalytic converter, and muffler.
- Do not allow flame or sparks near the battery. Gases are always present in and around the battery cell. An explosion could occur.
- Do not smoke.
- To avoid injury, always remove rings, watches, loose hanging jewelry, and loose clothing.

2 HOW TO FIND THE ELECTRICAL PROBLEM

TROUBLESHOOTING STEPS

These six steps present an orderly method of troubleshooting:

Step 1. Verify the problem.

- Operate the complete system and see all symptoms for yourself in order to:
 - check the accuracy and completeness of the customer's complaint.
 - learn more that might give a clue to the nature and location of the problem.

Step 2. Narrow the problem.

- Using this manual, narrow down the possible causes and locations of the problem in order to more quickly find the exact cause.
- Read the description of *How the Circuit Works* and study the wiring diagram. You should then know enough about the circuit operation to figure out where to check for this trouble.

Step 3. Test the cause.

- Use electrical test procedures to find the specific cause of the symptoms.
- *Troubleshooting Hints* will give some helpful ideas.
- The *Component Location* charts and the pictures will help you find components, grounds, and connectors.

Step 4. Verify the cause.

- Confirm the fact that you have found the correct cause through operating the parts of the circuit you think are good.

Step 5. Make the repair.

- Repair or replace the faulty components.

Step 6. Verify the repair.

- Operate the system as in Step 1 and check that your repair has removed all symptoms, and also has not caused any new symptoms.

Some engine circuits may need special test equipment and special procedures. See the *Shop Manual* and other service books for details. You will find the circuits in this manual to be helpful with these special tests.

TROUBLESHOOTING TOOLS

JUMPER WIRE

This is a test lead used to connect two points of a circuit. A **Jumper Wire** can complete a circuit by bypassing an open.

Uses: Bypassing Switches or Open Circuits

WARNING

Never use a jumper wire across loads (motors, etc.) connected between hot and ground. This direct battery short may cause injury or fire.

VOLTMETER

A DC **Voltmeter** measures circuit voltage. Connect negative (– or black) lead to ground, and positive (+ or red) lead to voltage measuring point.

OHMMETER

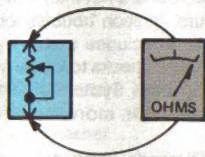


Figure 1 — Resistance Check

An **Ohmmeter** shows the resistance between two connected points (Figure 1).

TEST LAMP

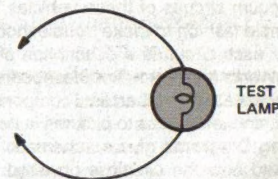


Figure 2 — Test Lamp

A **Test Lamp** is a 12-volt bulb with two test leads (Figure 2).

Uses: Voltage Check. Short Check

SELF-POWERED TEST LAMP

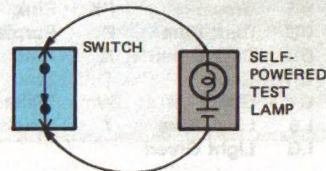


Figure 3 — Continuity Check

The **Self-Powered Test Lamp** is a bulb, battery and set of test leads wired in series (Figure 3). When connected to two points of a continuous circuit, the bulb glows.

Uses: Continuity Check. Ground Check

CAUTION

When using a self-powered test lamp or ohmmeter, be sure power is off in circuit during testing. Hot circuits can cause equipment damage and false readings.

TROUBLESHOOTING CHECKS

SWITCH CIRCUIT CHECK

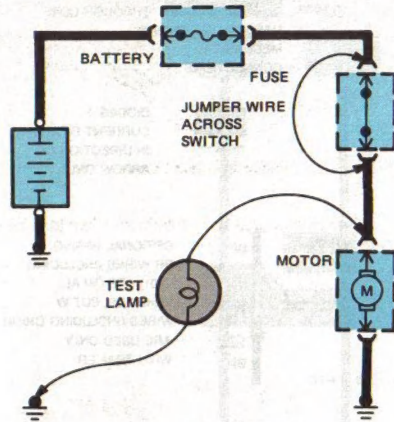


Figure 4 — Switch Circuit Check and Voltage Check

In a bad circuit with a switch in series with the load, jumper the terminals of the switch to power the load. If jumping the terminals powers the circuit, the switch is bad (Figure 4).

CONTINUITY CHECK (Locating open circuits)

With power off connect one lead of **Self-Powered Test Lamp** or **Ohmmeter** to each end of circuit (Figure 3). Light will glow if circuit is closed. Switches and fuses can be checked in the same way.

VOLTAGE CHECK

Connect one lead of **Test Lamp** to a known good ground, or the negative (–) battery terminal. Test for voltage by touching the other lead to the test point. Bulb goes on when the test point has voltage (Figure 4).

SHORT CHECK (Short to ground)

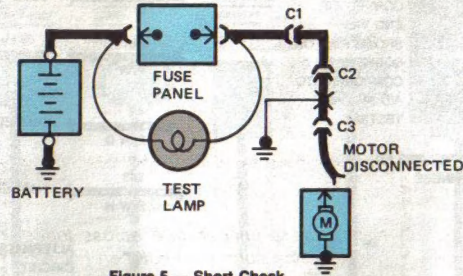


Figure 5 — Short Check

A fuse that repeatedly blows is usually caused by a short to ground. It's important to be able to locate such a short quickly (Figure 5).

1. Turn off everything powered through the fuse.
2. Disconnect other loads powered through the fuse:
 - Motors: disconnect motor connector.
 - Lights: remove bulbs.
3. Turn **Ignition Switch** to RUN (if necessary) to power fuse.
4. Connect one **Test Lamp** lead to hot end of blown fuse. Connect other lead to ground. Bulb should glow showing power to fuse. (This step is just a check to be sure you have power to the circuit.)
5. Disconnect the **Test Lamp** lead from ground and reconnect it to the load side of the fuse.
 - If the **Test Lamp** is off, the short is in the disconnected equipment.
 - If the **Test Lamp** goes on, the short is in the wiring. You must find the short by disconnecting the circuit connectors one at a time until the **Test Lamp** goes out. For example: with a ground at X, the bulb goes out when C1 or C2 is disconnected, but stays on after disconnecting C3. This means the ground is between C2 and C3.

"GOOD GROUND" CHECK

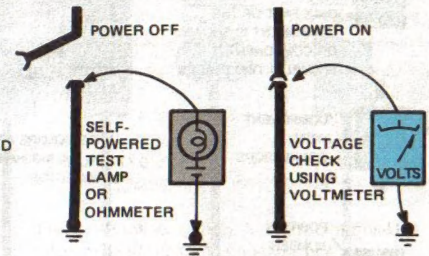


Figure 6 — Grounds Check

Turn on power to circuit. Perform Voltage Check between suspected bad ground and frame. Any voltage means ground is bad.

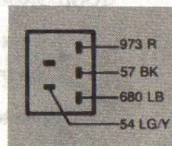
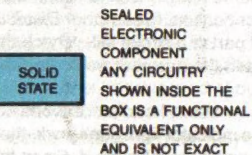
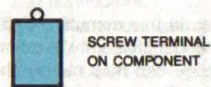
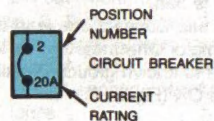
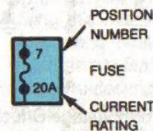
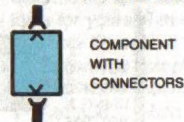
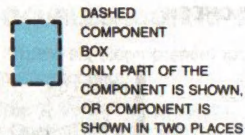
Turn off power to circuit. Connect one lead of **Self-Powered Test Lamp** or **Ohmmeter** to wire in question, and the other to known ground. If bulb glows, circuit ground is OK (Figure 6).

TROUBLESHOOTING HINTS

The circuit schematics in this manual are designed to make it easy to identify common points in circuits. This knowledge can help narrow the problem to a specific area. For example, if several circuits fail at the same time, check for a common power or ground connection. (See *Power Distribution* or *Grounds*). If part of a circuit fails, check the connections between the part that works and the part that doesn't work.

For example, if low beam headlights work, but high beams and the indicator light don't work, then power and ground paths must be good. Since the dimmer switch is the component which switches this power to the high beam lights and indicator, it is most likely the cause of failure.

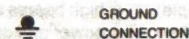
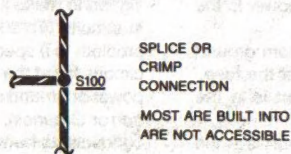
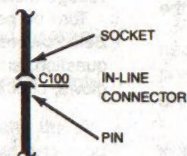
4 ELECTRICAL SYMBOLS



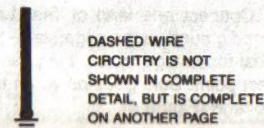
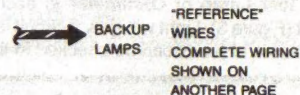
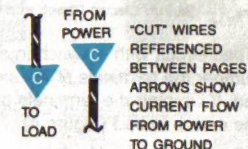
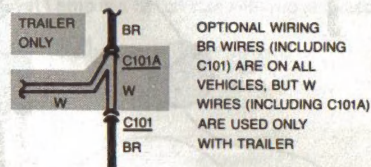
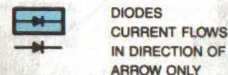
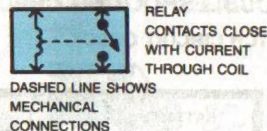
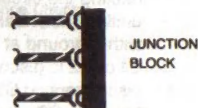
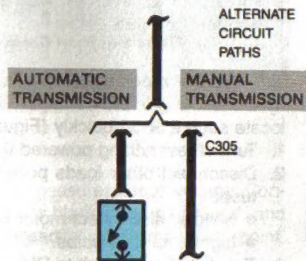
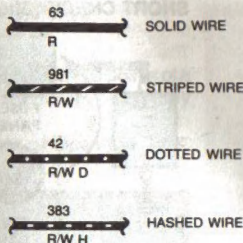
COMPONENT CONNECTOR END VIEW SHOWS PINS OR SOCKETS ON A COMPONENT TO AID IN BENCH TESTING

WIRE COLORS ARE LABELED FOR MATING HARNESS CONNECTOR

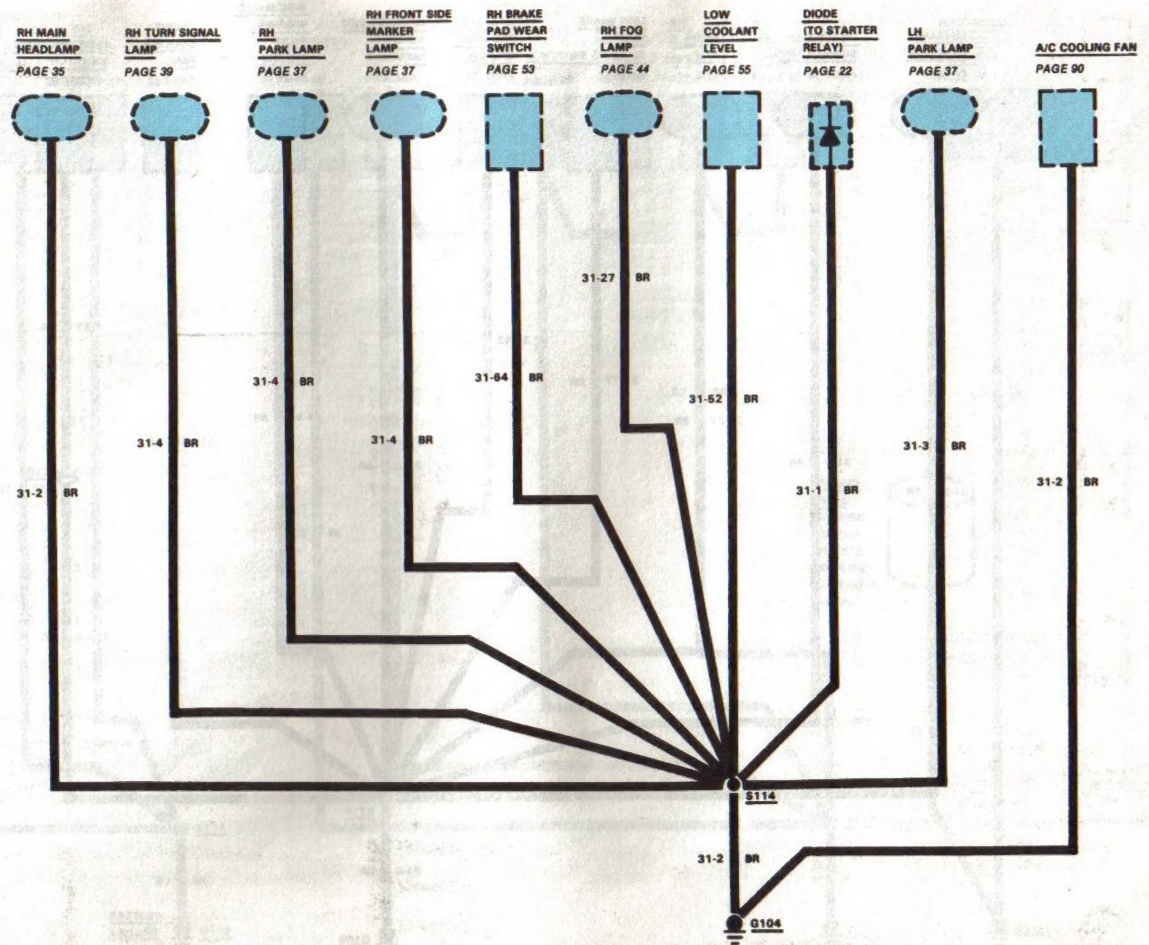
● — PIN AND BLADE TERMINAL TYPES
○ □ SOCKET TYPES



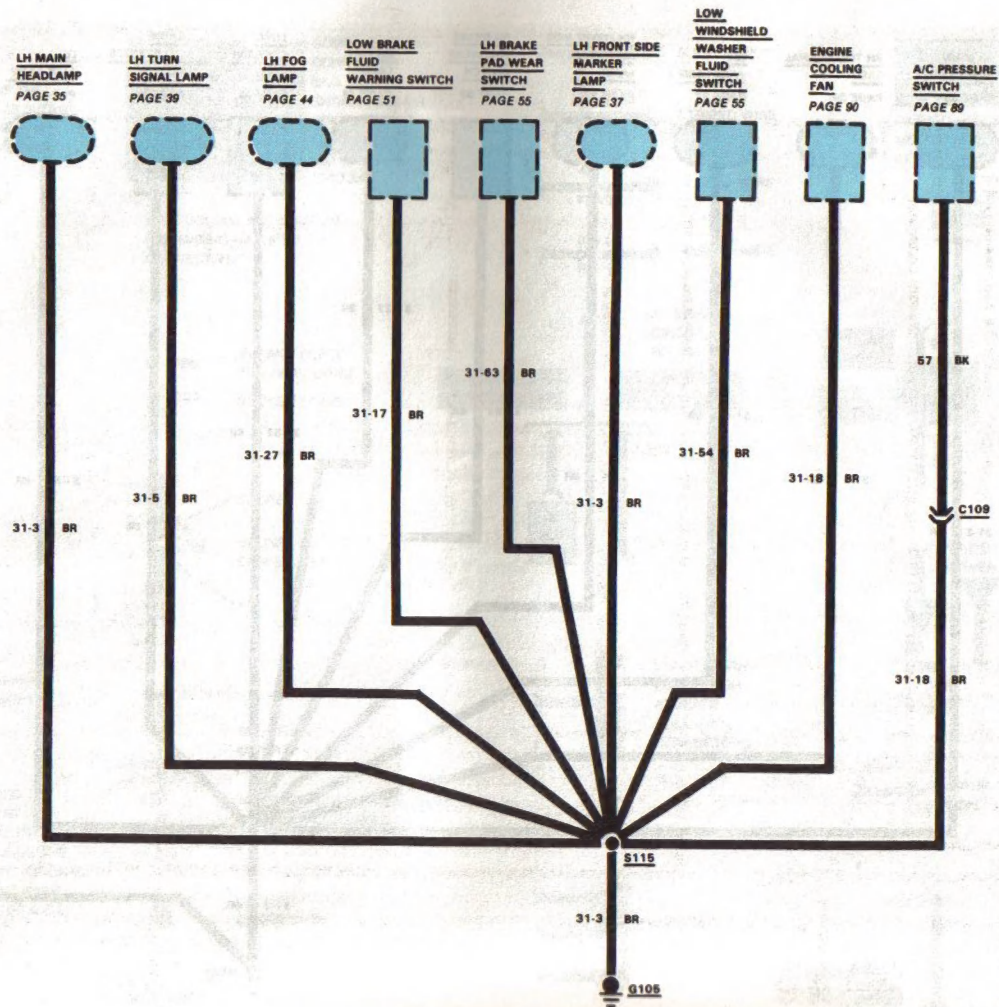
○ 20 GA BLUE ● FUSE LINK

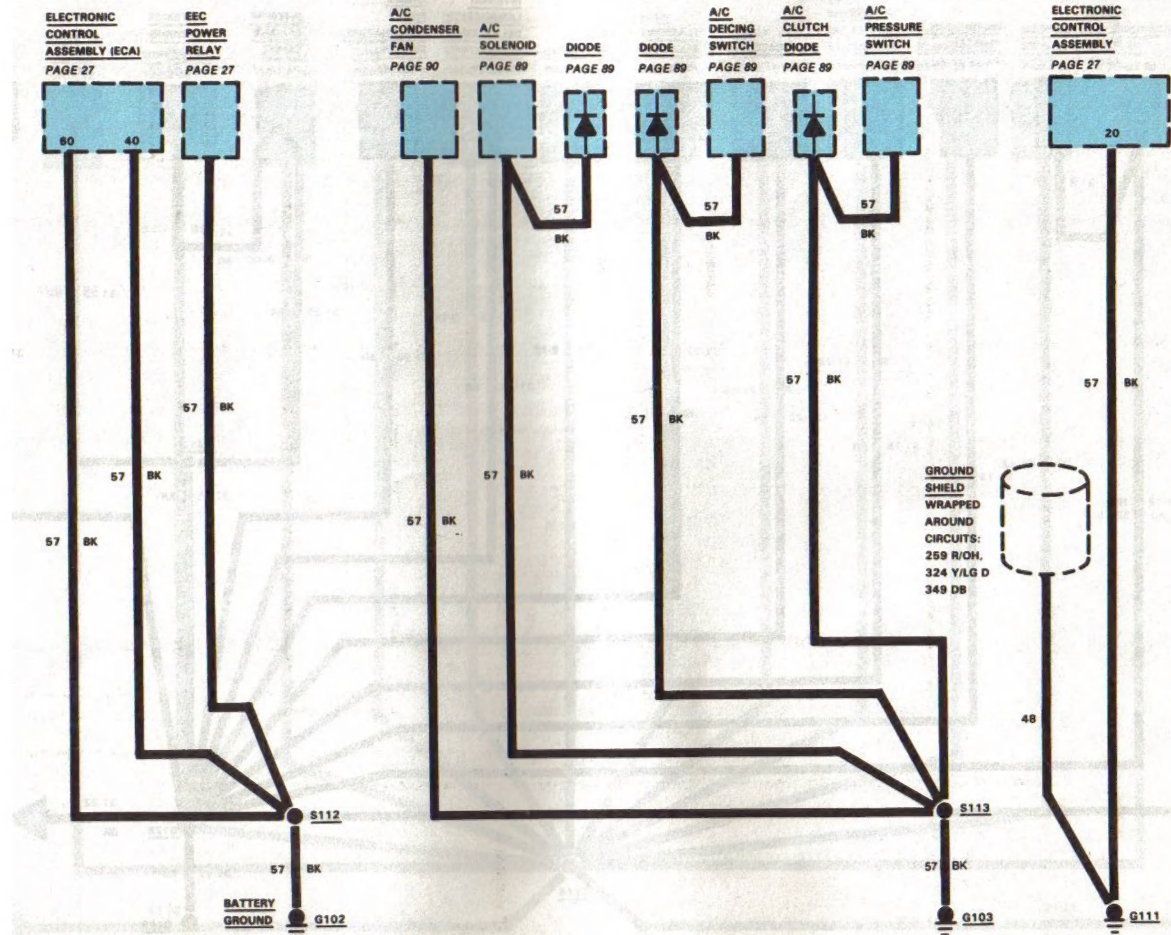


SEE GROUNDS
PAGES 4, 5, 6, 7

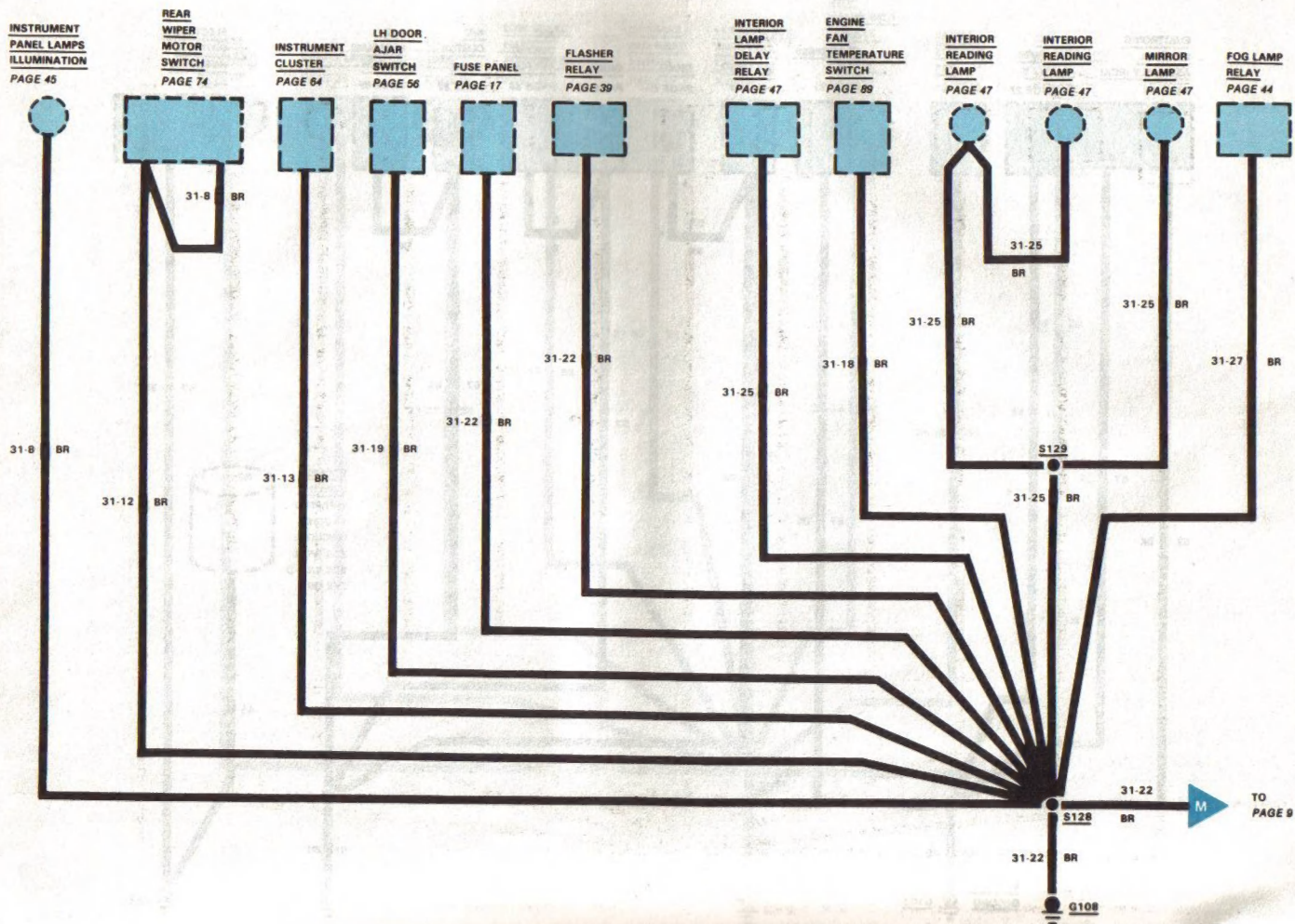


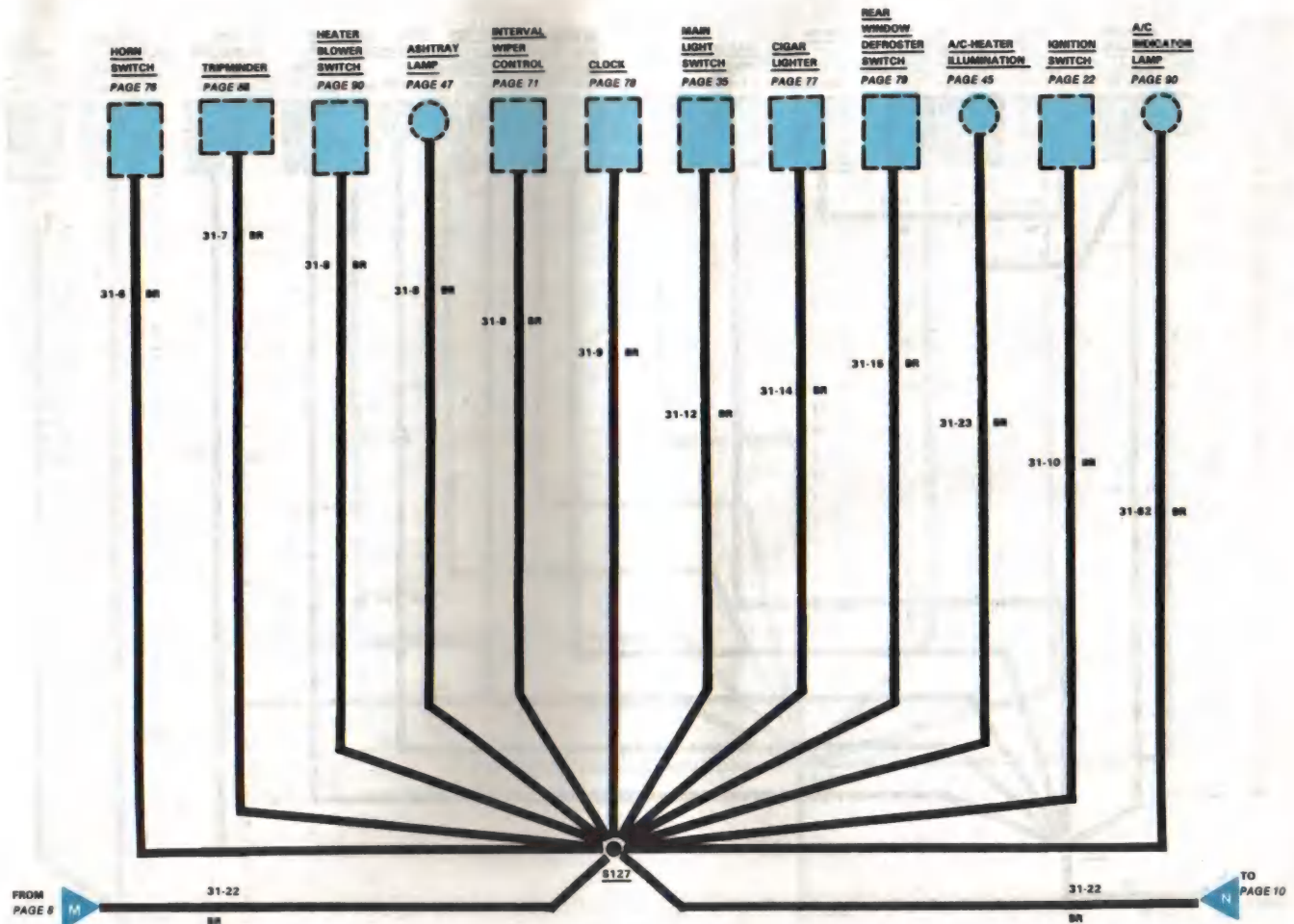
6 GROUND (G105) (BODY-FRONT)



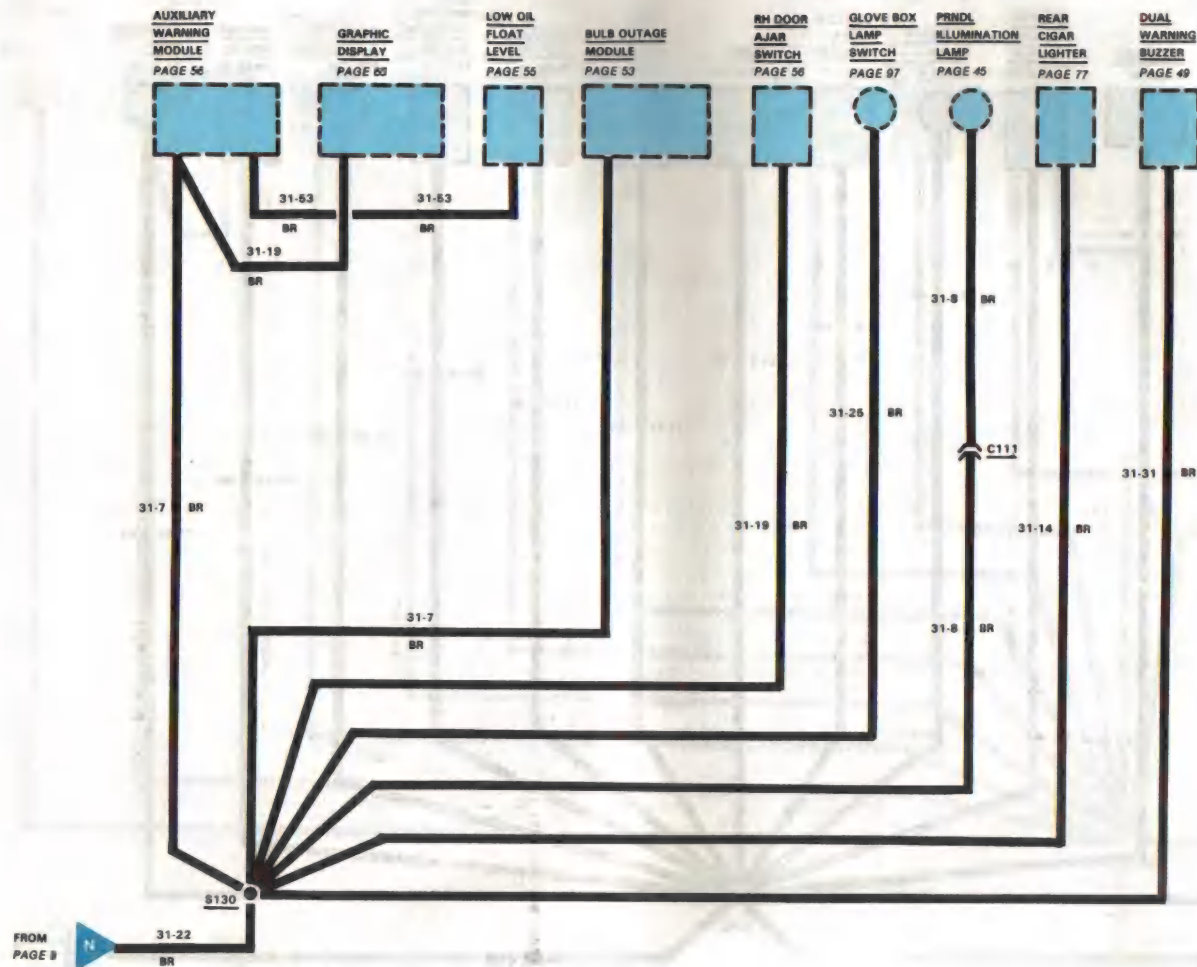


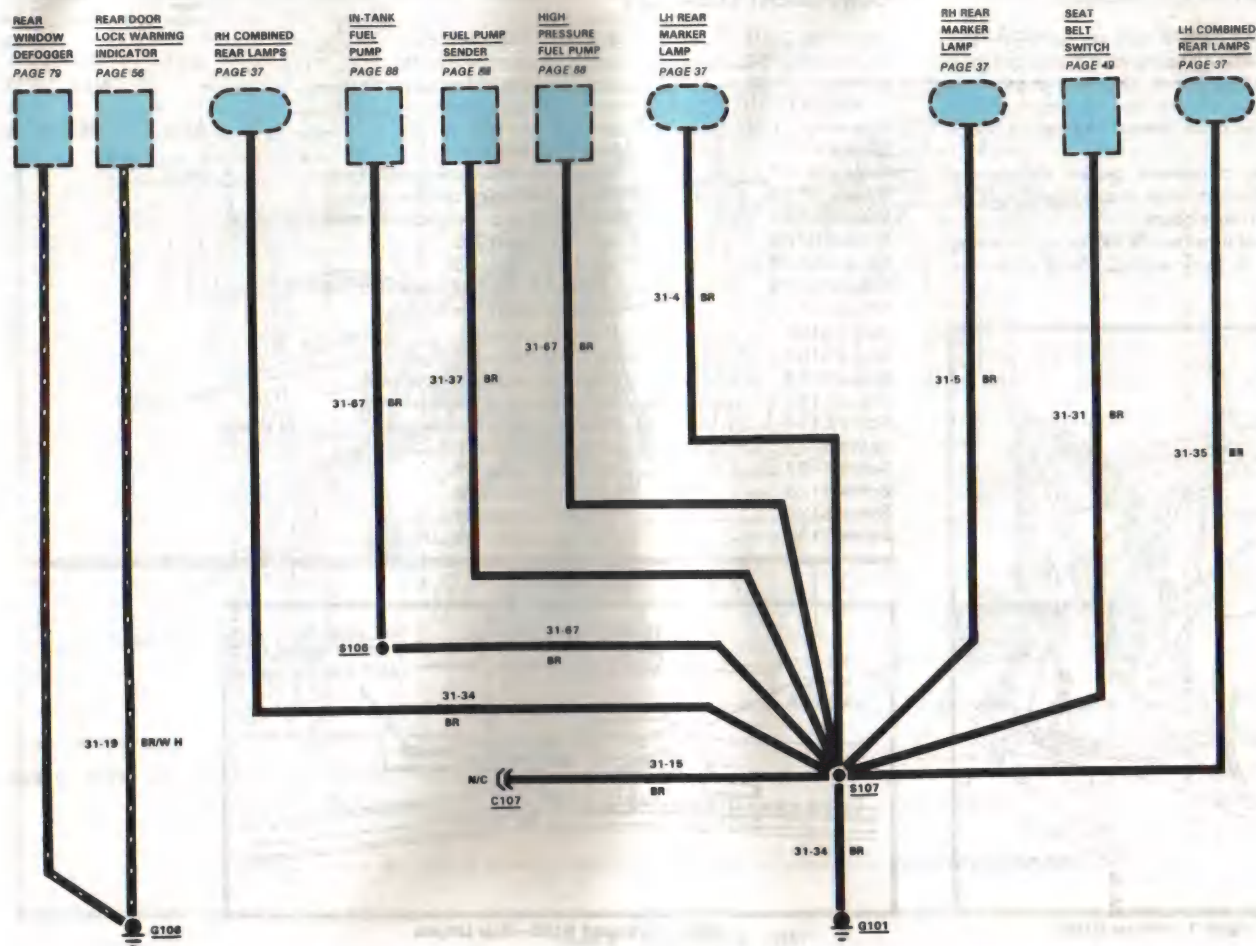
8 GROUND (G108)





10 GROUND (G108) (CONT'D)





12 GROUNDS

HOW THE CIRCUIT WORKS

The ground circuits here are complete, and connect several components together to screw terminal ground points. On other pages only parts of these circuits may be shown. Partial ground circuits are shown dashed on those pages.

Simple or component ground circuits are shown on the individual circuit pages, and are complete on those pages.

The ground wires are **57 BK** for engine wiring or **31-XX** for body wiring, unless otherwise noted.

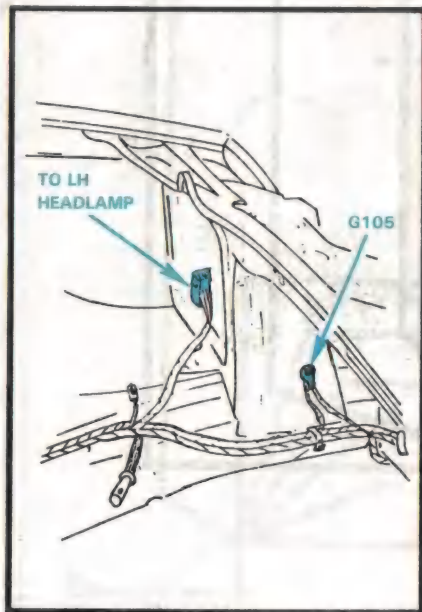


Figure 1 — Ground G105

COMPONENT LOCATION

	Page-Figure	Color	Terminals
Connector C107			1
Connector C108			1
Connector C109	80-1	BK	2
Connector C110		NAT	1
Connector C111		BK	5
Ground G101	83-5		
Ground G102			
Ground G103			
Ground G104	33-2		
Ground G105			
Ground G106	12-1		
Ground G108	12-2		
Ground G111	13-3		
Splice S106			
Splice S107			
Splice S112			
Splice S113			
Splice S114			
Splice S115			
Splice S127			
Splice S128			
Splice S129			
Splice S130			

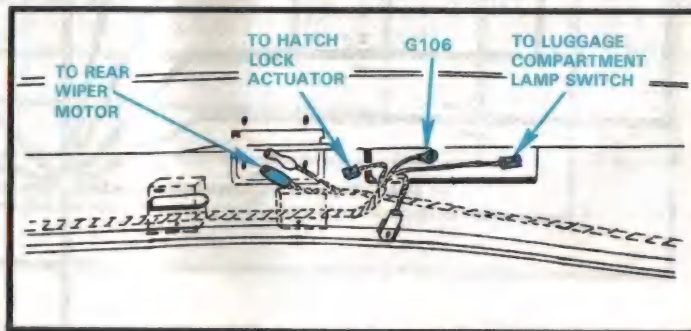


Figure 2 — Ground G106—Rear Liftgate

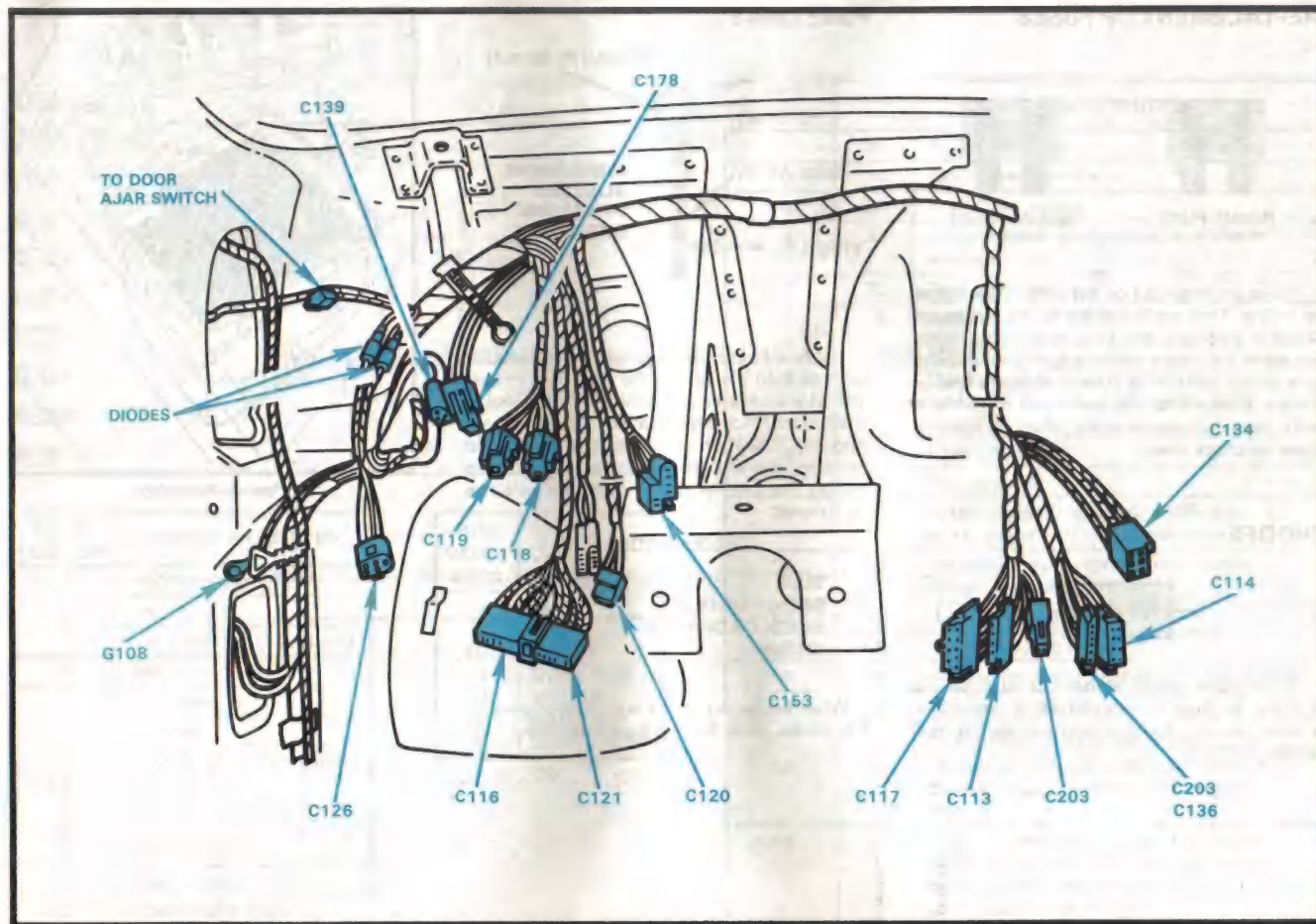


Figure 3 - Ground G108-LH I/P*

14 FUSE PANEL/CIRCUIT PROTECTION

REPLACEMENT OF FUSES



GOOD FUSE



BLOWN FUSE

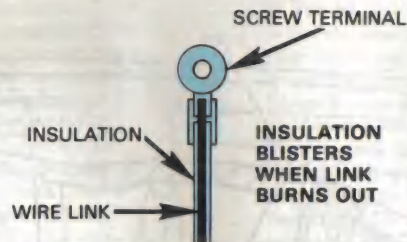
Fuses are mounted on either the **Fuse Panel** or in-line. They are identified by the numbered value in amperes, and by a color code. Some positions may have either a fuse with adapter or a circuit breaker. Be sure to replace a fuse or circuit breaker with the same kind of unit and with the same ampere rating. Remove fuses in order to check them.

DIODES



Diodes are electrical devices that permit current to flow in one direction only. The current flows in the direction indicated by the arrow.

FUSE LINKS



The fuse link is a short length of wire smaller in gage than the wire in the protected circuit. The wire is covered with a thick non-flammable insulation. An overload causes the link to heat and the insulation to blister. If the overload remains, the link will melt, causing an open circuit. The links are color coded for wire size as follows:

COLOR CODE

BLUE	20 GA
BROWN OR RED	18 GA
BLACK OR ORANGE	16 GA
GREEN	14 GA

When replacing, make tight crimp joints or hot solder joints for good connections.

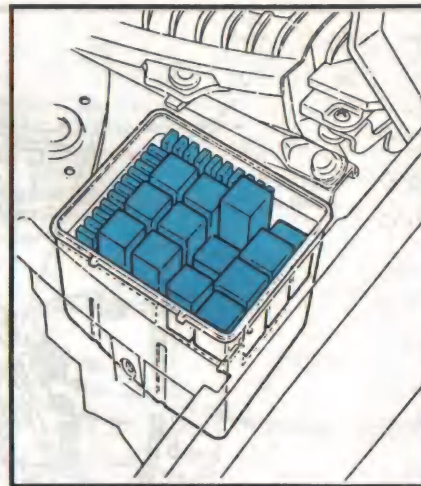
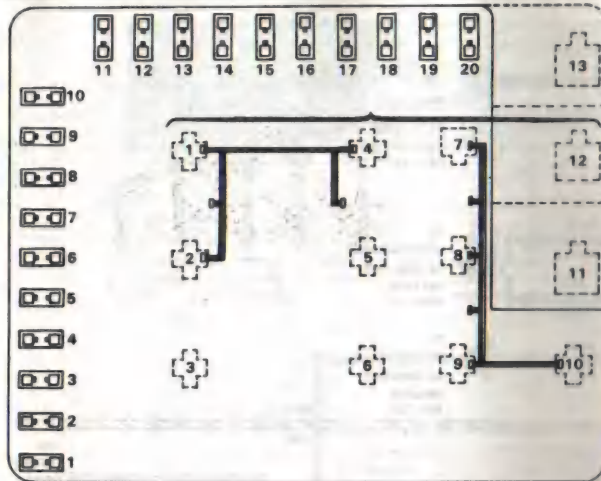


Figure1— Fuse Block

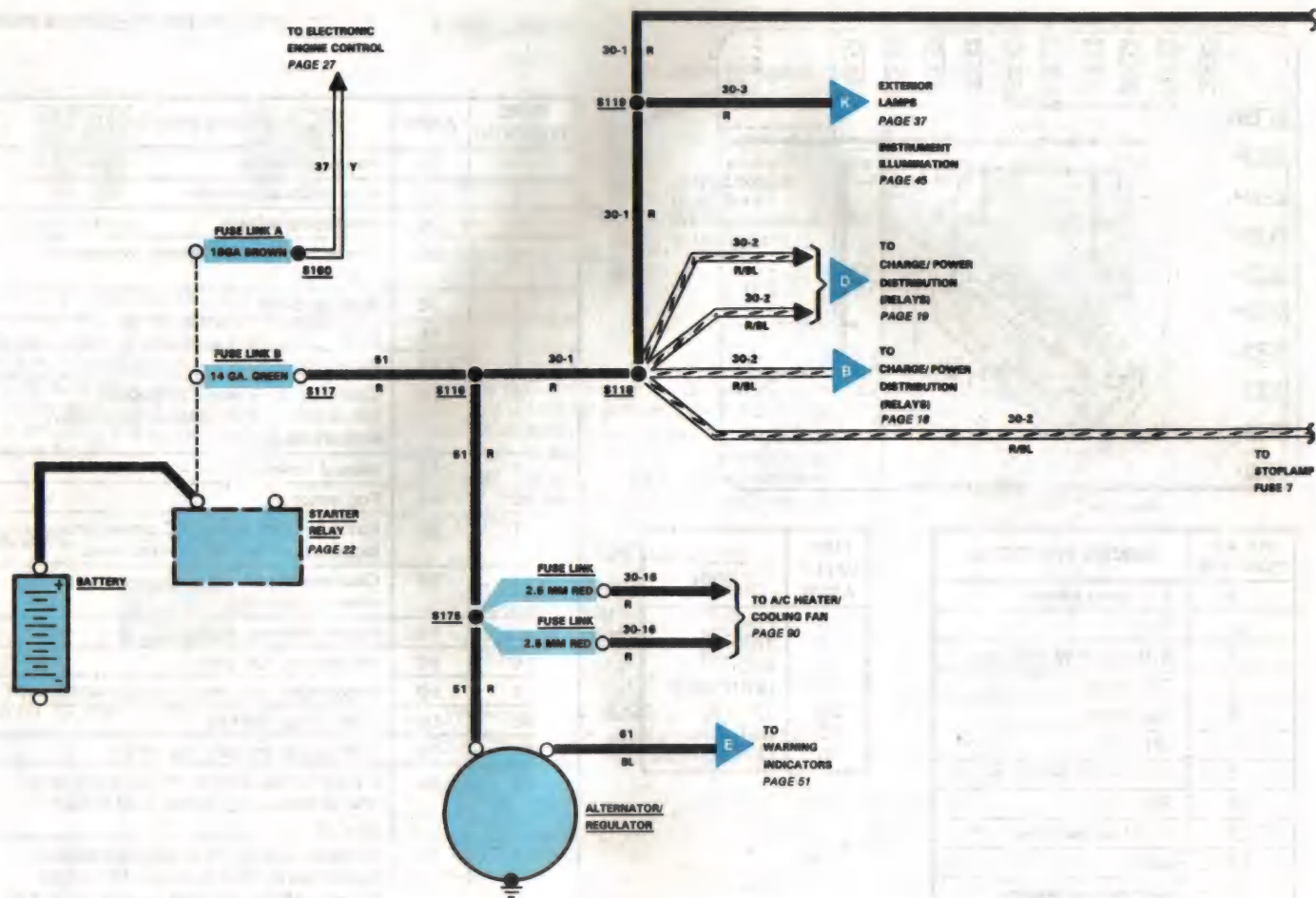


RELAY POSITION	CIRCUIT PROTECTED
1	A/C temp switch
2	Horn
3	A/C clutch W.D.T. cutout
4	Fuel pump
5	Fog lamps
6	Liftgate
7	Interval windshield wipers
8	Stop lamp
9	Seat belt reminder
10	Ignition switch
11	Rear interval wipers
12	Interior lamp delay
13	Rear window defogger

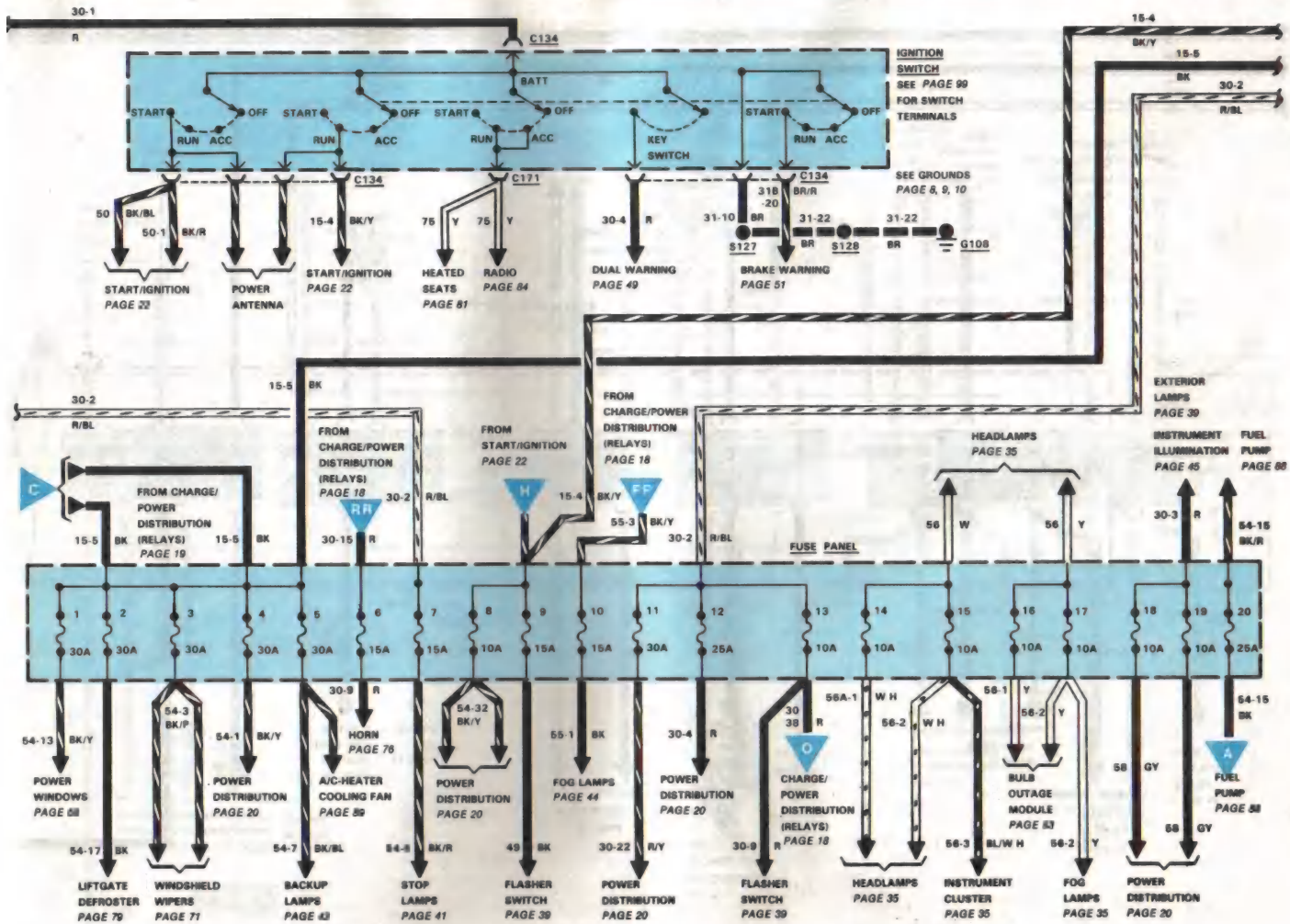
FUSE VALUE AMPS	COLOR CODE
4	PINK
5	TAN
10	RED
15	LIGHT BLUE
20	YELLOW
25	NATURAL
30	LIGHT GREEN

FUSE POSITION	AMPS	CIRCUITS PROTECTED
1	30	Power windows
2	30	Rear window defroster
3	30	Windshield wipers
4	30	Heater blower, rear wipers, windshield washers
5	30	Back-up lamps
6	15	Horn
7	15	Stop lamps
8	10	Clock, auxiliary warning module, instrument cluster, interior lamp delay, windshield wipers
9	15	Hazard flashers
10	15	Fog lamps
11	30	Hatch release, heater/AC power door locks, power mirrors, heated seats
12	25	Courtesy lamps, cigar lighters, vanity mirror, trip minder
13	10	Hazard flashers, horn
14	10	Headlamps, fog lamps
15	10	Headlamps, instrument cluster illumination
16	10	Bulb outage module
17	10	Bulb outage module, fog lamps
18	10	Marker lamps, engine compartment lamp, license lamps, fog lamps, bulb outage module
19	10	I/P illumination control, ash tray lamps, heated seats, marker lamps, turn signal lamps, auxiliary warning module, glove box lamp bulb outage module
20	15	Fuel pump

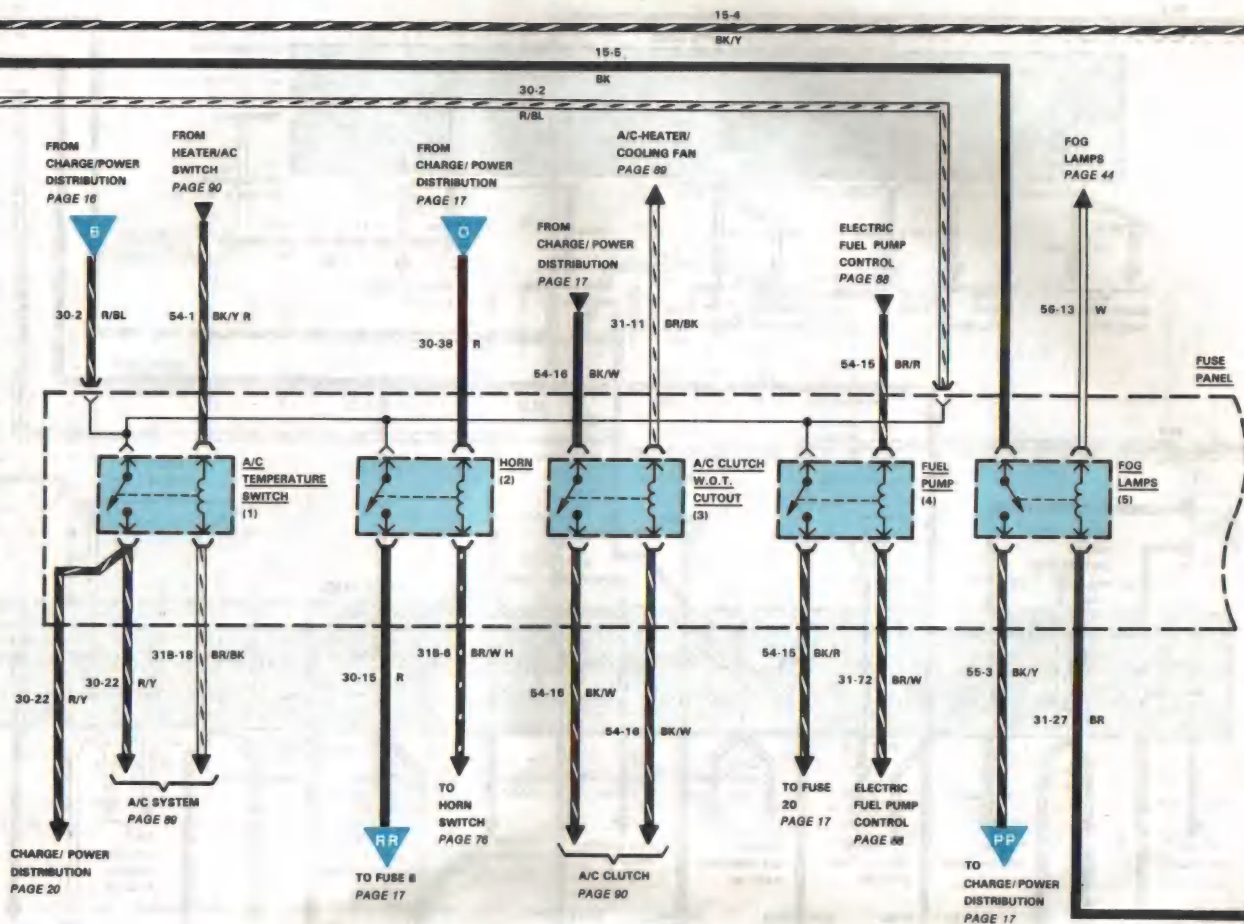
16 CHARGE / POWER DISTRIBUTION

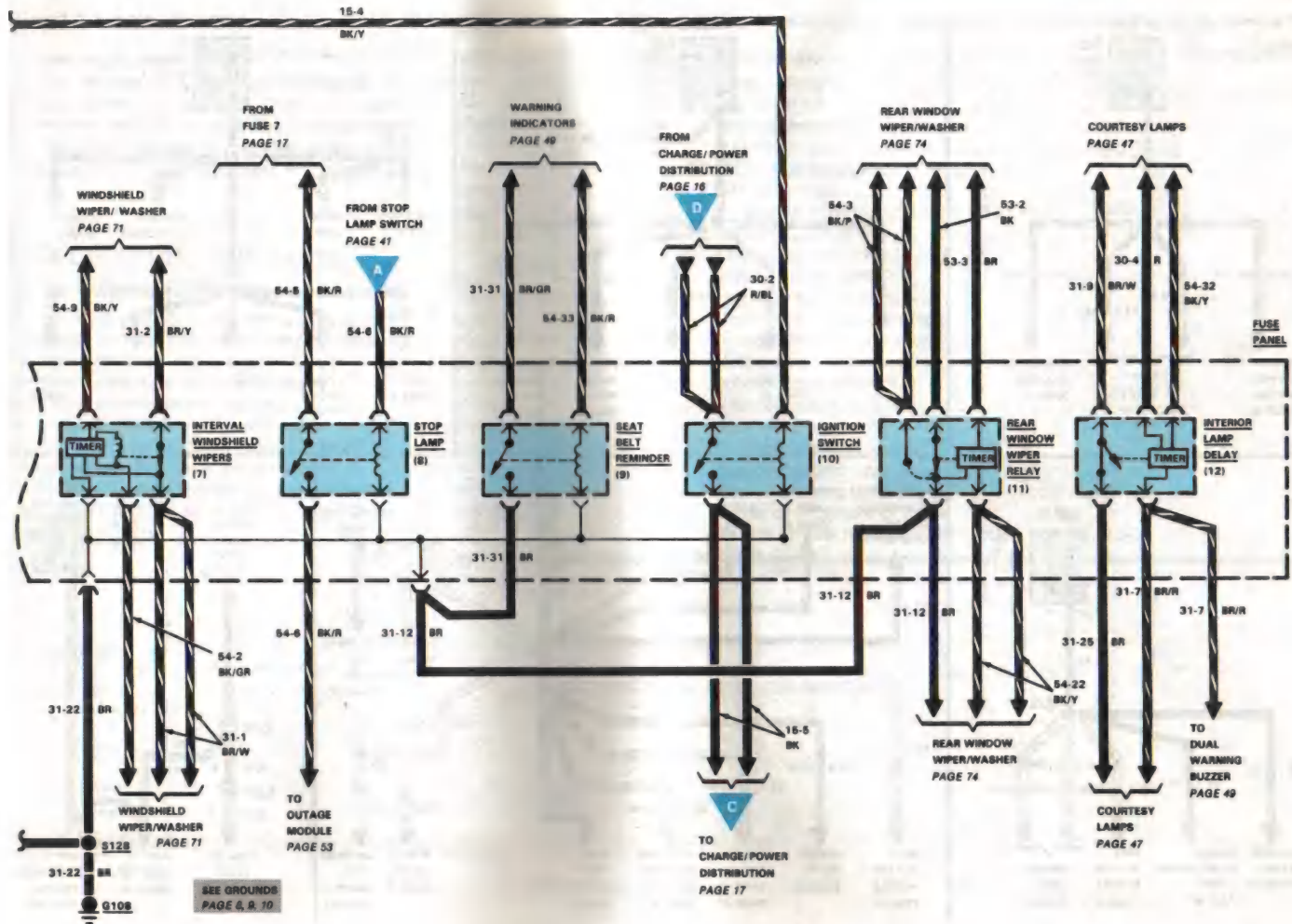


CHARGE / POWER DISTRIBUTION 17

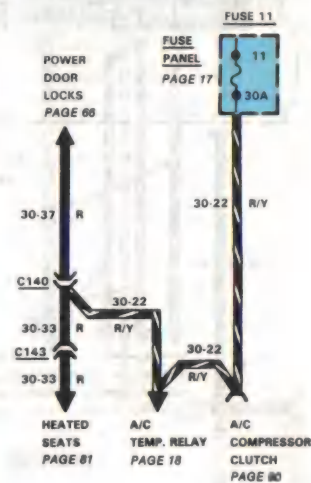
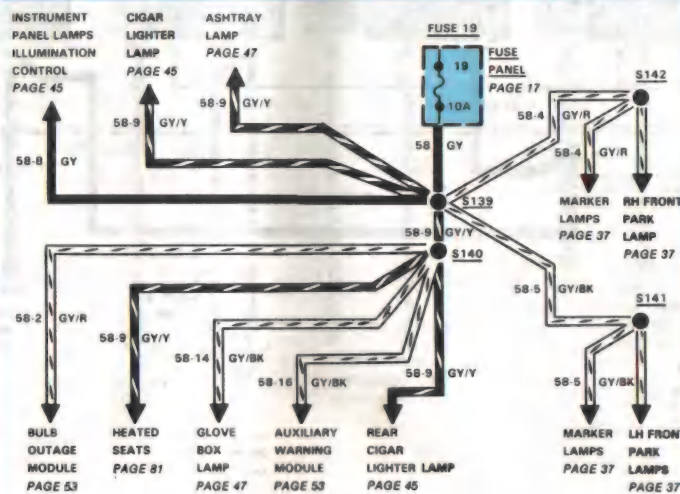
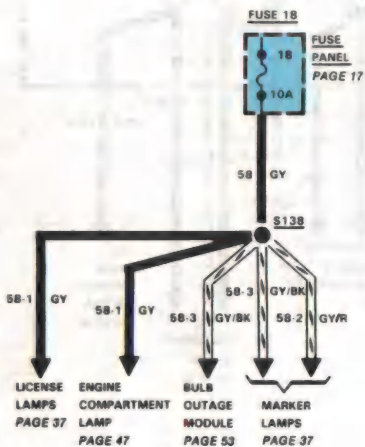
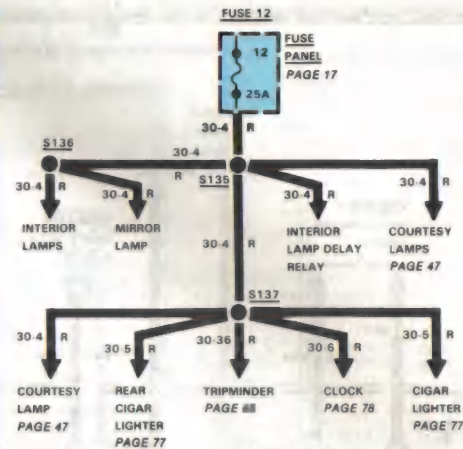
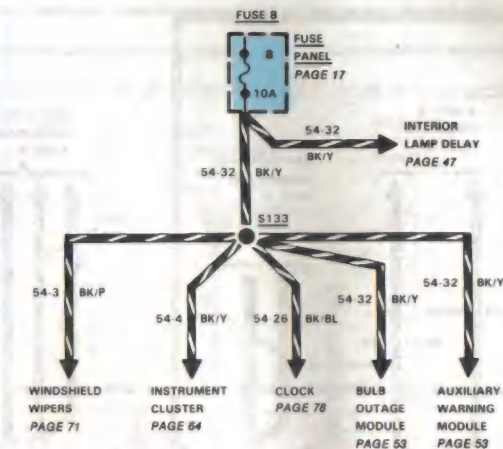
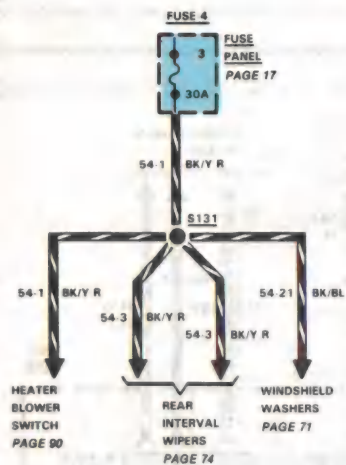


18 CHARGE / POWER DISTRIBUTION (RELAYS)





20 POWER DISTRIBUTION (FUSES 4, 8, 12, 18, 19, 11)



HOW THE CIRCUIT WORKS

Power Distribution

The **Battery** is connected directly to the **Starter Relay** hot terminal. From the **Starter Relay** hot terminal, current flows through **Fuse Link A** and **Fuse Link B** to power all the other circuits except the engine and A/C condenser fans.

TROUBLESHOOTING HINTS

IMPROPER CHARGING

The most common charge system complaints are dead **Battery**, and **Alternator Warning Indicator** on at normal speed.

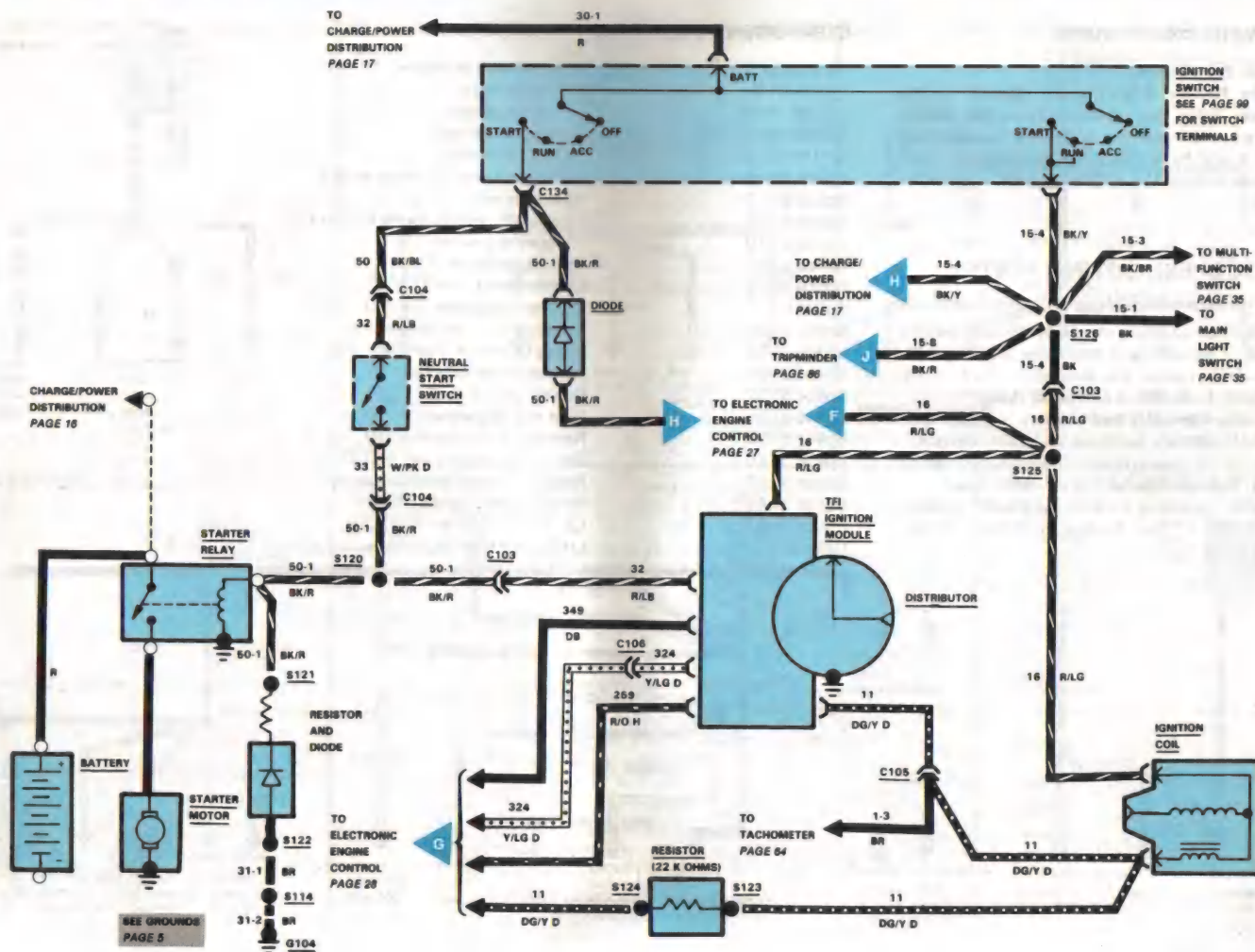
- Check **Fuse Link B** at **Starter Relay**.
- Check **Alternator** belt tension.
- Check **Battery** terminals and cable clamps.
- Check for clean and tight connections on **Alternator**, **Voltage Regulator**, and **Starter Relay**.

Read "Charging System Diagnosis" in Section 31-01 of Shop Manual for detailed **Charging System** tests.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Alternator	Front LH side of engine			
Fuse Link B	At starter relay	26-4		
Starter Relay	RH fender apron	26-4		
Connector C134	At ignition switch	13-3		
Connector C171	At ignition switch	82-1		
Splice S116	RH front of engine compartment			
Splice S117	At starter relay			
Splice S118	LH side I/P, near foglamp switch T/O			
Splice S119	In steering column			
Splice S127	Behind center of I/P			
Splice S128	LH side along frame			
Splice S131	Near rear wiper switch T/O			
Splice S133	Center of I/P, near tripminder			
Splice S135	Along LH frame, near door post			
Splice S136	Near dome/map lamp			
Splice S137	Behind center of I/P			
Splice S138	Near rear wiper switch T/O			
Splice S139	Near rear wiper switch T/O			
Splice S140	Near dual warning buzzer T/O			
Splice S141	Near windshield washer bottle			
Splice S142	Near RH parking lamp T/O			
Splice S151	Center of I/P, near tripminder			
Ground G108	LH side I/P near foglamp switch T/O	13-3		

22 START /IGNITION



START

HOW THE CIRCUIT WORKS

The **Battery**, **Starter Motor**, **Starter Relay**, and **Ignition Switch** make up the **Starting System**. In vehicles with automatic transmission, the **Back-up/Neutral Safety Switch** must be closed (PARK or NEUTRAL) in order to operate the **Starter Motor**.

Turning the **Ignition Switch** to START sends current through the **Starter Relay** coil and operates the relay. Current from the **Battery** then flows directly through the **Starter Relay** to the **Starter Motor** to start the engine.

When the **Ignition Switch** is in START, **Battery** voltage is applied to both the START (circuit 32) and RUN (circuit 16) terminals of the **Thick Film Integrated Design Ignition (TFI) Module**. When the Ignition Switch is released to the RUN position, the voltage on circuit 32 goes to zero.

TROUBLESHOOTING HINTS

CHECK BATTERY AND CABLES

- Check condition of **Battery**. Recharge or replace if necessary.
- Check **Battery** posts and cable lugs.
- Check cable terminals at **Starter Relay**, engine ground, and **Starter Motor**, and clean if necessary. Make sure cable wire strands are securely attached in terminals. Cables are tight when eyelet can't be easily turned by hand.

IF BATTERY CRANKS SLOWLY

- Check **Battery** and cables (see above).
- If still slow, repair or replace **Starter Motor**.

IF STARTER RELAY CHATTERS OR DOESN'T CLICK

- Check **Battery** and cables (see above).

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Alternator	LH side of engine			
Ignition Coil	LH fender apron	25-1		
Neutral Start Switch	Part of transmission assembly	43-1		
Starter Relay	LH fender apron	26-4		
TFI Ignition Module	Mounted to distributor	24-2		
Connector C103	LH front fender apron	25-3	BK	3
Connector C104	Beneath center of vehicle, near transmission			4
Connector C105	LH front fender apron		GY	8
Connector C106	LH fender apron near distributor			2
Connector C134	At ignition switch	13-3	BR	6
Ground G104	Near RH headlamp			
Splice S114	Near RH headlamp			
Splice S120	Near low oil sensor T/O			
Splice S121	At starter relay			
Splice S122	At starter relay			
Splice S123	LH fender apron near distributor			
Splice S124	LH fender apron near distributor			
Splice S125	LH front fender apron			
Splice S126	In steering column			

- Make sure **Starter Relay** bracket is grounded tightly.
- With R/LB wires removed from **Starter Relay**, and transmission in PARK or NEUTRAL, jumper this terminal on **Starter Relay** to main terminal (**Battery** connection). If **Starter Motor** works, check **Ignition Switch** and **Neutral Switch** on transmission. Check wiring to **Starter Relay** for open or dirty connections. If this jumper doesn't operate **Starter Relay**, replace it.

IF STARTER DOES NOT CRANK AND STARTER RELAY CLICKS

- Clean and tighten cable connection to **Starter Motor** terminal and relay terminals. Check cable to **Starter Motor** for damage and make sure wire strands are secure in eyelets.

- If still bad, repair or replace **Starter Motor**.

IF STARTER SPINS (HUMMING NOISE) BUT DOES NOT CRANK ENGINE

- Remove **Starter Motor**. Repair or replace starter drive.
- Read "Testing" in Section 28-02 of Shop Manual for detailed Starting System tests.

IGNITION

HOW THE CIRCUIT WORKS

The Merkur Ignition system contains **Thick Film Integrated Design Ignition (TFI) Module**, which is mounted on the side of the **Distributor**. The **Distributor** is vertically mounted, and driven by the engine camshaft gear (Figure 00-0)

When the engine is cranking or running:

- The magnetic pickup in the **Distributor** sends pulse to the **TFI Module** as the tooth on the armature passes the magnet on the stator.
- The **TFI Module** switches current on and off in the primary circuit of the **Ignition Coil** according to the **Distributor** pulses:
- Each interruption of primary current makes the **Ignition Coil** secondary produce an open circuit high-voltage pulse of up to 40,000 volts;
- High voltage pulses are transmitted to the **Distributor**, which sends them to fire the spark plugs.

TROUBLESHOOTING HINTS

The following steps are intended only as quick checks to identify and locate some of the more frequent problems. If these checks do not solve the problem, refer to the **Ignition System** diagnosis procedures in the Engine/Emissions Diagnosis Manual for complete system tests.

If the **Ignition System** is OK, check the fuel system and the engine itself.

PRELIMINARY CHECKS

- a. Check **Battery** for proper state of charge and for clean, tight battery terminal connections.
- b. Inspect all wires and connectors for breaks, cuts, abrasions or burned spots. Repair or replace as necessary. Make sure all wires are connected correctly.
- c. Unplug all connectors and inspect for corroded or burned contacts. Repair as necessary and plug connectors back together. Do NOT remove grease in connectors.
- d. Check for loose or damaged spark plug or coil wires. If boots or nipples are removed on ignition wires, reapply new silicone dielectric compound.
- e. Check that **TFI Module** is securely attached to **Distributor**.

SPECIAL TEST JUMPER

Make up a test jumper as shown in Figure 1 below. It is important to use only this test jumper when making these checks. Solid wire jumpers will not work for the quick checks.

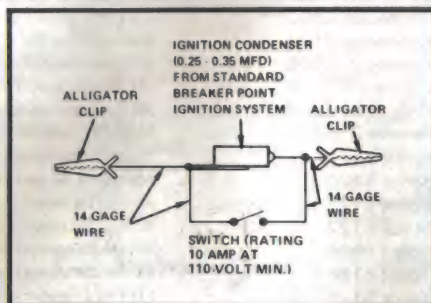


Figure 1— Ignition Test Jumper

VOLTAGE TEST

Disconnect connector at **TFI Module**. Check for battery voltage between each pin (+) and ground (–) as follows (use a straight pin in connector socket hole to make contact):

- a. With **Ignition Switch** in OFF position, check for 0 volts at each terminal.
 - If voltage is present, check **Ignition Switch**.
- b. Set **Ignition Switch** to RUN. Check for battery voltage at R/LG and DB/Y D wires.
 - Check continuity of **Ignition Switch**, **Ignition Coil**, and wires if bad.
- c. Disconnect R/LB wire lug at **Starter Relay**. Set **Ignition Switch** to START. Check for battery voltage at all three wires.
 - Check continuity of **Ignition Switch** and R/LB wires if bad.
- d. Reconnect R/LB wire lug at **Starter Relay**.

RUN MODE SPARK TEST

- a. Remove coil wire from **Distributor** cap. Install spark tester or modified spark plug (side electrode removed) in coil wire terminal.
- b. Unplug connector at **TFI Module**. In the harness side of the connector, connect the special test jumper (Figure 1) between ground and the DG/Y D lead. Use a straight pin in connector socket hole to make contact.

CAUTION

Do not leave test jumper closed for more than one second at a time.

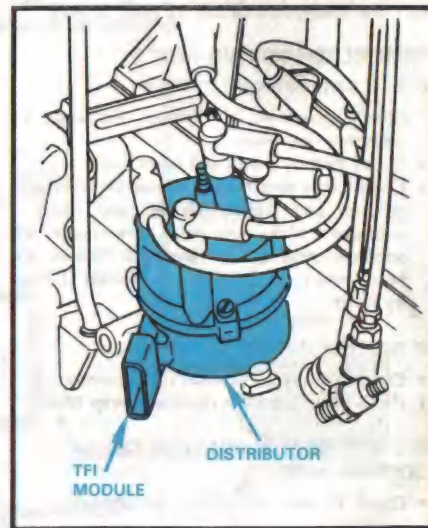


Figure 2— Distributor

c. With the Ignition Switch in RUN, close the test jumper switch. Leave closed for about one second, then open. Repeat this several times. There should be a SPARK each time this switch is opened.

— If there is NO SPARK, the problem is in the primary circuit. Check coil for internal shorts or opens. Check primary resistance (0.5 ohm) and secondary resistance (8000 to 11,500 ohms). Replace coil if necessary.

— If there is SPARK, the primary circuit wiring and coil are OK. The problem is in the Distributor pickup, or the TFI Module.

DISTRIBUTOR PICKUP TEST

1. There is no access to the output of the Hall effect pick-up device in the EEC-IV distributor.

Refer to applicable Section in Engine/Emissions Diagnosis Manual for distributor diagnostics utilizing outputs from EEC-IV module.

CAUTION

If the vehicle has a catalytic converter, disconnect the air supply line between the By-pass Valve and the Manifold before cranking the engine with the Ignition Switch in OFF. This will prevent damage to the catalytic converter.

After testing, run the engine for at least 3 minutes before reconnecting the air supply line to clear excess fuel from the exhaust system.

NOTE

Do not use a voltmeter which is combined with a dwell-meter. Slight needle oscillations (1/2 volt) may not be detectable on this type of test unit.

CAUTION

Do not crank engine for more than 10 seconds.

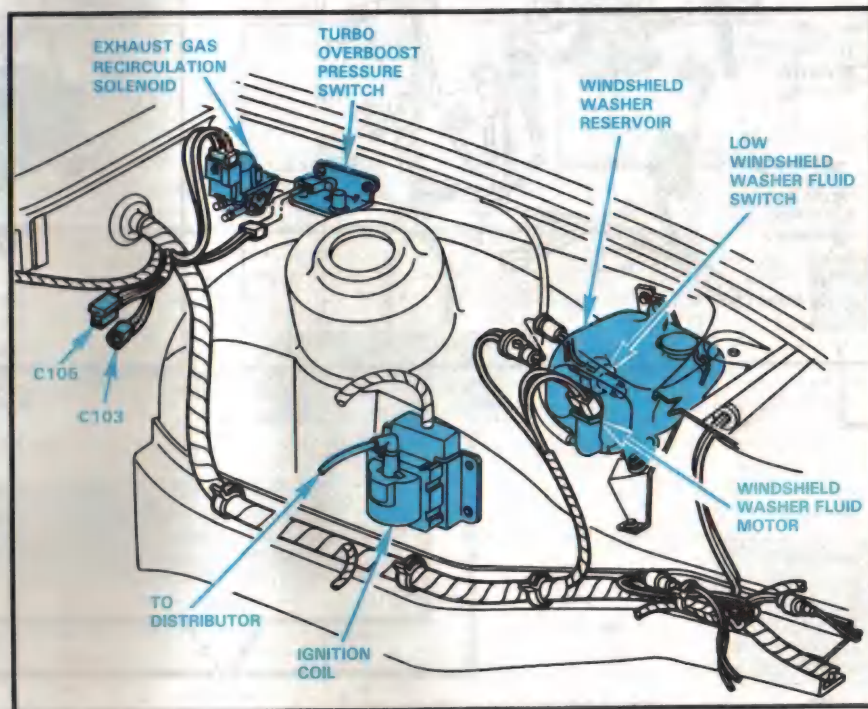


Figure 3—LH Fender Apron

26 START /IGNITION

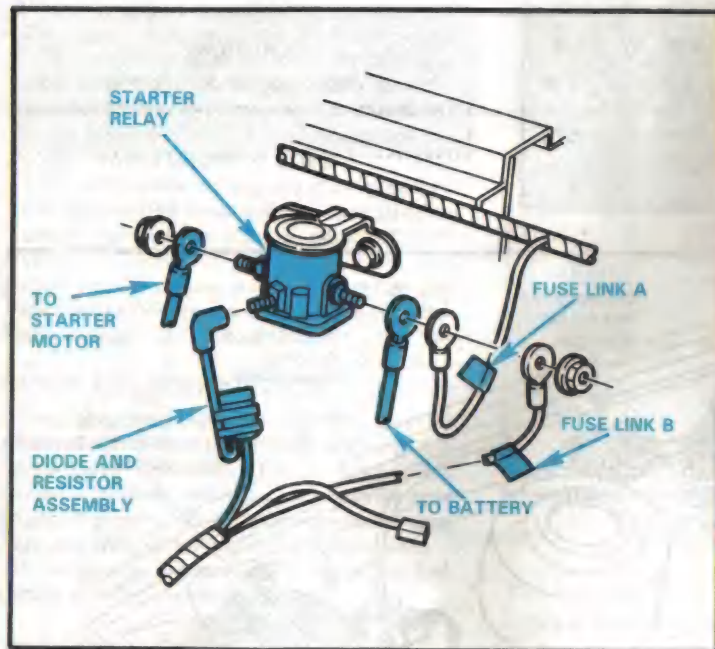


Figure 4—Starter Relay

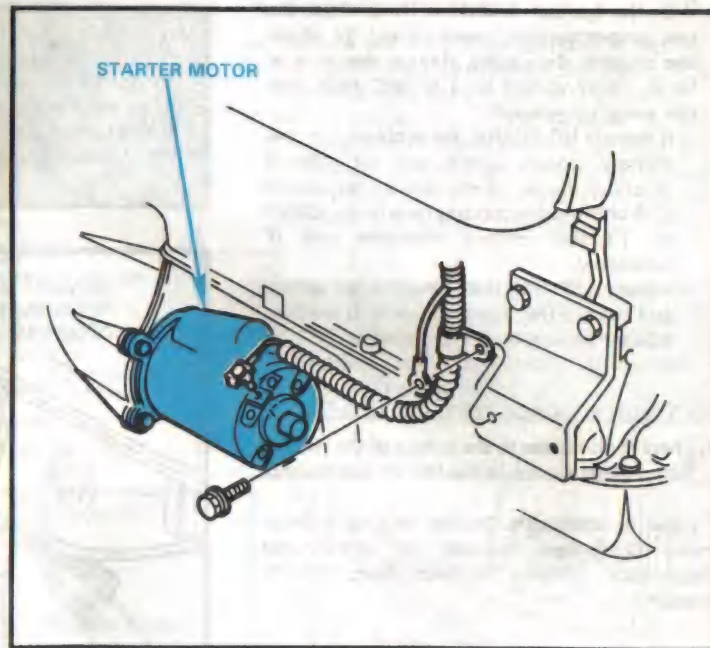
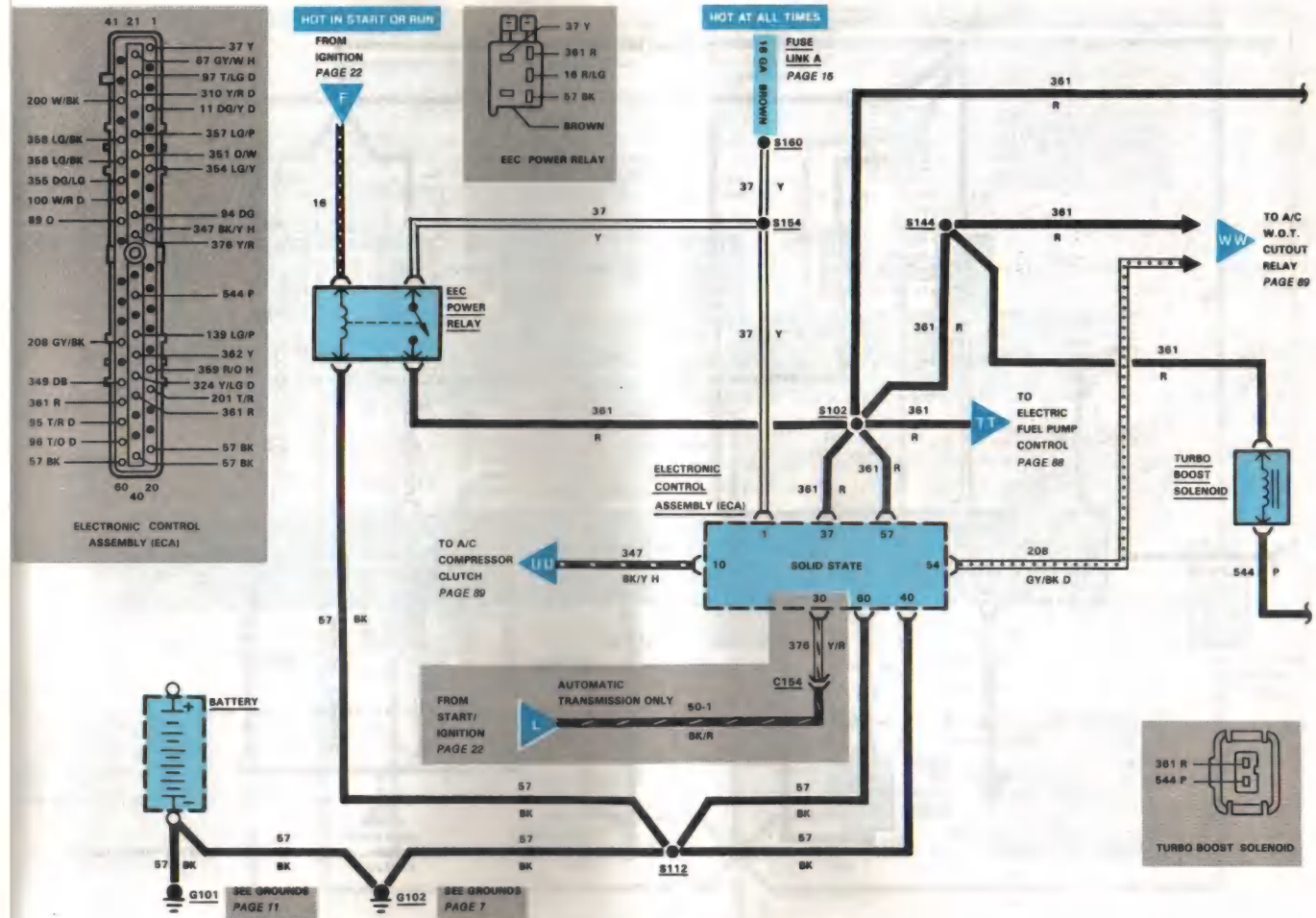
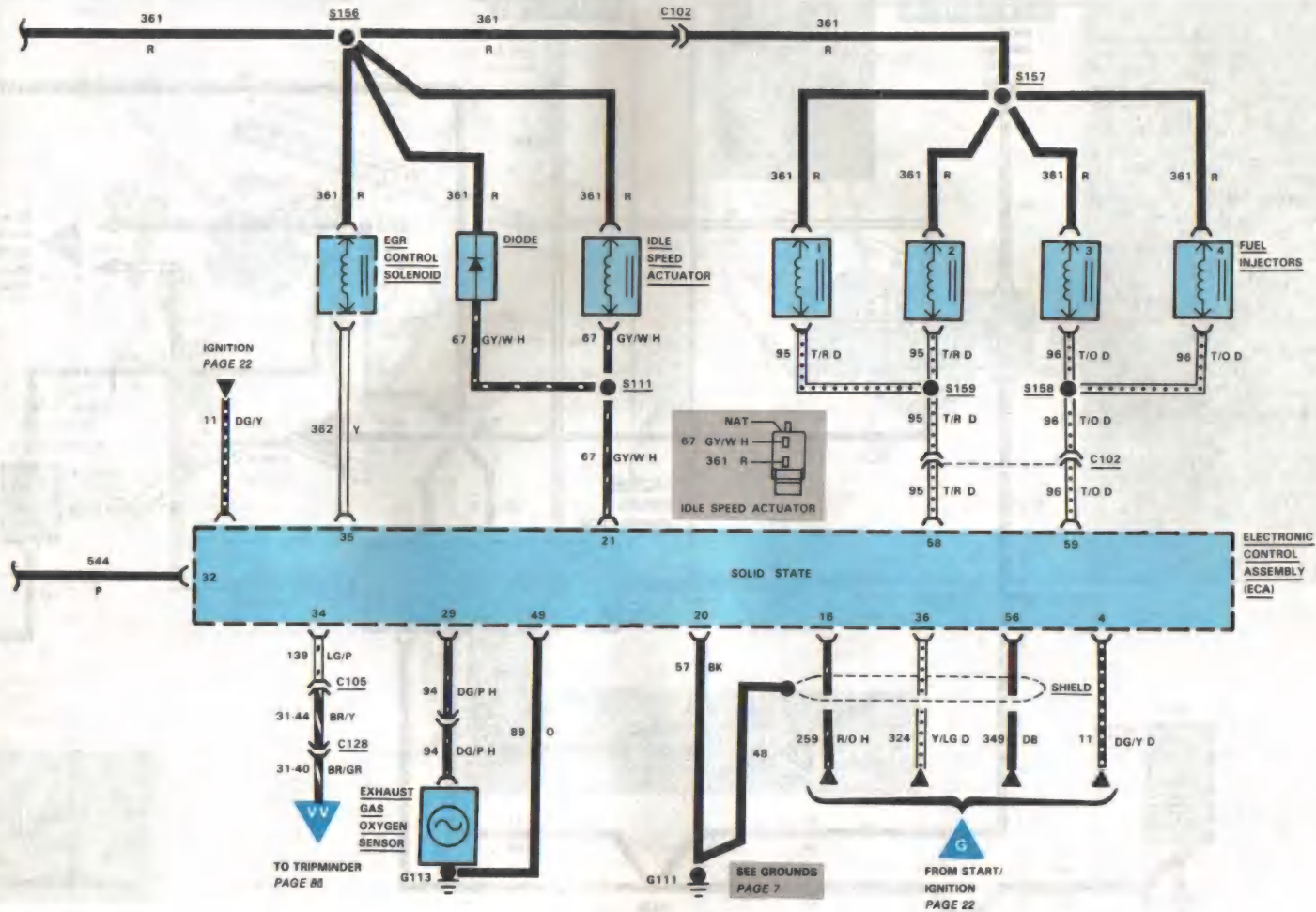
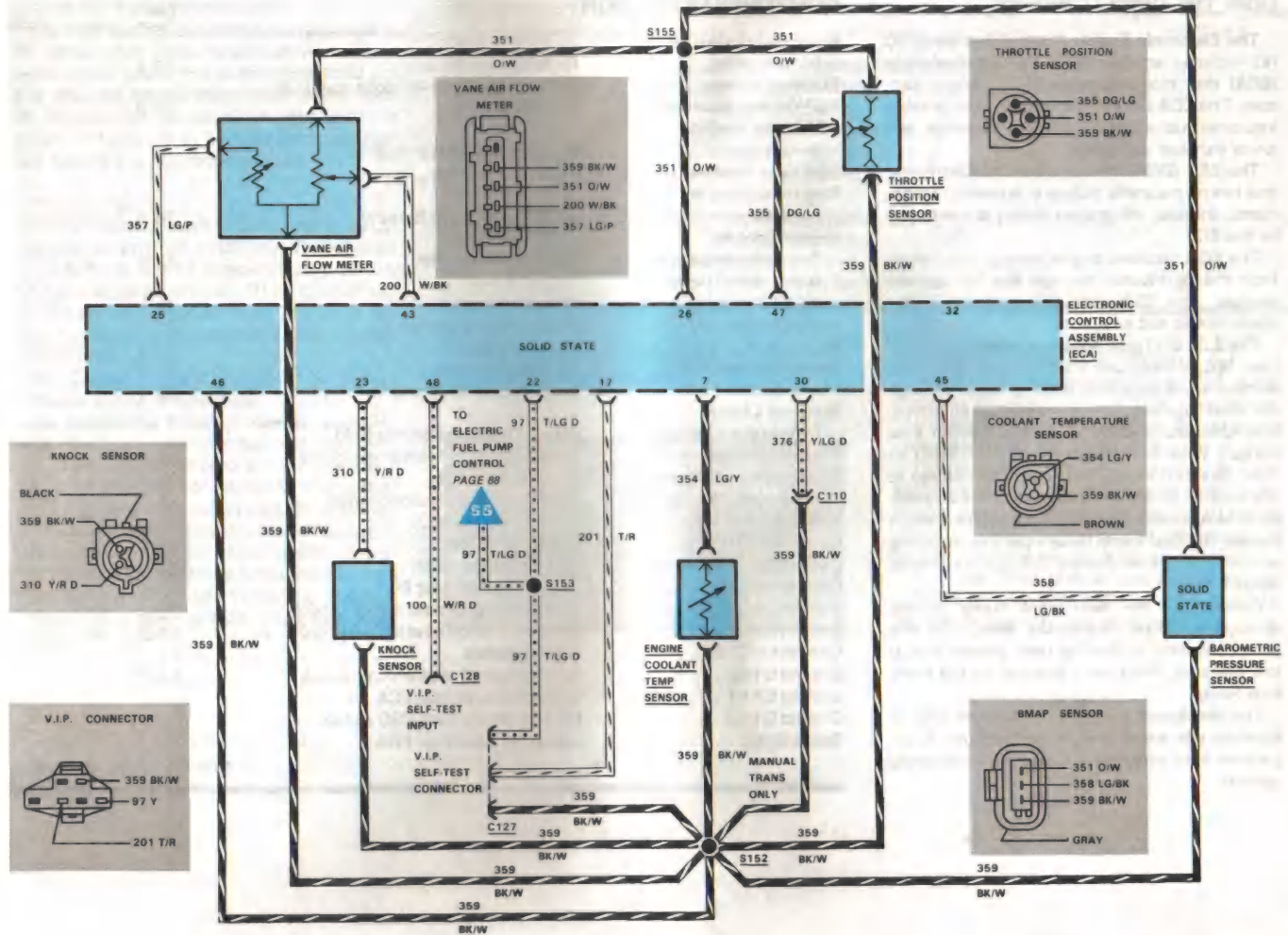


Figure 5—Starter Motor



28 ELECTRONIC ENGINE CONTROL





30 ELECTRONIC ENGINE CONTROL

HOW THE CIRCUIT WORKS

The **Electronic Engine Control System (EEC IV)** includes an **Electronic Control Assembly (ECA)** that receives inputs from various sensors. The ECA uses this information to provide improved fuel economy and performance, and lower exhaust emissions.

The **EEC SYSTEM** has a special **Distributor** that has no magnetic pickup or advance mechanisms. Instead, all ignition timing is controlled by the **ECA**.

The **ECA** receives engine timing information from the **Distributor** through the **TFI Ignition Module**. The **ECA** uses this information for spark timing and advance.

The 2.3L EFI Turbo engine used on the Merkur uses **EEC IV** Electronic Fuel Injection (EFI). Fuel is injected directly into each cylinder through the **Fuel Injectors**. A carburetor is not used. Fuel pressure is built up by the **Electric Fuel Pumps**. With the **Ignition Switch** in **START** or **RUN**, the **EEC Power Relay** applies voltage to the circuit. When controlled by the **Electronic Control Assembly**, and with the **Inertia Switch** closed, the **Fuel Pump Relay** operates, applying power to the **Fuel Pumps** through the **Inertia Switch**.

Current to the **Rear Fuel Pump** passes through a ballast **Resistance Wire**, and this pump, mounted in the fuel tank, pumps fuel at low pressure. Pressure is boosted by the **Front Fuel Pump**.

The **Idle Speed Actuator** controls air flow to increase idle speed on low temperature. It adjusts for load when the A/C and power steering operate.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Barometric Pressure				
Sensor	RH fender apron	33-2		
EEC Power Relay	Attached to lower RH cowl near ECA			
EGR Control Solenoid	LH fender apron	25-3		
EGR Valve Position				
Sensor	At top of RH front of engine			
EGR Vent Solenoid	LH front of engine			
Electronic Control				
Assembly	Attached to lower RH cowl	34-3		
Engine Coolant				
Temperature Sensor	Top front of engine	32-1		
Exhaust Gas Oxygen				
(EGO) Sensor	LH rear of engine	32-1		
Fuel Injectors	Upper LH side of engine	32-1		
Fuse Link A	At starter relay	26-4		
Idle Speed Actuator	LH side of engine	32-1		
Knock Sensor	Bottom, LH rear of engine	32-1		
Manifold Charge				
Temperature Sensor	RH side of engine on manifold			
TFI Ignition Module	Connected to RH side of distributor	32-1		
Throttle Position Sensor	LH side of engine	32-1		
Turbo Boost Solenoid	RH side engine at turbocharger	33-2		
Vane Air Flow Meter	RH front of engine	33-2		
Connector C102	LH fender apron	32-1	BK	4
Connector C105	LH side fender apron	25-3	GY	8
Connector C110	Lower RH cowl near ECA			1
Connector C127	RH fender apron near BMAP takeoff	33-2	GY	6
Connector C128	RH fender apron near BMAP takeoff	33-2	GY	1
Connector C190	At EGO pigtail	52-1		1
Ground G102	RH side rear of engine compartment	33-2		
Ground G111	Lower RH cowl near ECA			
Ground G113	RH side engine near EGO sensor			
Splice S102	Lower RH cowl near ECA			

(Continued on next page)

Exhaust Gas Recirculation (EGR)

The **EGR Control Solenoid** sends vacuum to the ported EGR valve, which allows exhaust gases to recirculate. The solenoid operates at a time after the engine starts. With higher coolant temperature at start, the time delay is shorter. It turns off at high temperature, high load (boost) and high engine speed.

Sensing Devices

Various sensing devices are used to determine engine operating conditions. They provide the **ECA** with throttle pressure, temperature, and exhaust gas information. The Throttle Position Sensor sends one of three signals to the **ECA** to indicate closed, partially open, or wide open throttle.

The **Engine Coolant Temperature Sensor** measures engine temperature.

The **Barometric Pressure Sensor** measures atmospheric pressure (changes with altitude).

The **Exhaust Gas Oxygen Sensor** provides a voltage to the **ECA** for regulating the air/fuel ratio by sensing the oxygen content of the exhaust gases. Oxygen shows a lean exhaust gas mixture while no oxygen shows a rich mixture.

The **Vane Air Flow Meter** measures both the temperature and flow rate of inlet air. The **ECA** computer uses these signals to calculate mass air flow.

COMPONENT LOCATION (Continued from previous page)

Splice S111	LH fender apron
Splice S112	RH rear of engine compartment
Splice S144	Center of dash panel
Splice S152	Lower RH cowl near ECA
Splice S153	Lower RH cowl near ECA
Splice S154	Lower RH cowl near ECA
Splice S155	RH rear of engine compartment
Splice S156	LH fender apron
Splice S157	Near fuel injectors
Splice S158	Near fuel injectors
Splice S159	Near fuel injectors
Splice S160	RH side fender apron near starter relay

The **Knock Sensor** detects engine knock so that timing can be changed.

NOTE

If engine does not operate after a collision, it is possible the Inertia Switch has opened. Switch can be reset by pushing down on plunger of switch.

TROUBLESHOOTING HINTS

The **EEC** engine operates with 10° BTDC constant spark timing, and EGR system does not operate, there is a problem in either the calibration assembly or the **ECA** (LOS mode)

The constant 10° advance is a fail-safe mode which permits the car to be driven in for service when the electronics are not operating correctly. When this happens, it is necessary to go into the full electronics diagnosis routine.

Read the Shop Manual and special service bulletins for complete **EEC** test procedures using special Rotunda test equipment.

32 ELECTRONIC ENGINE CONTROL

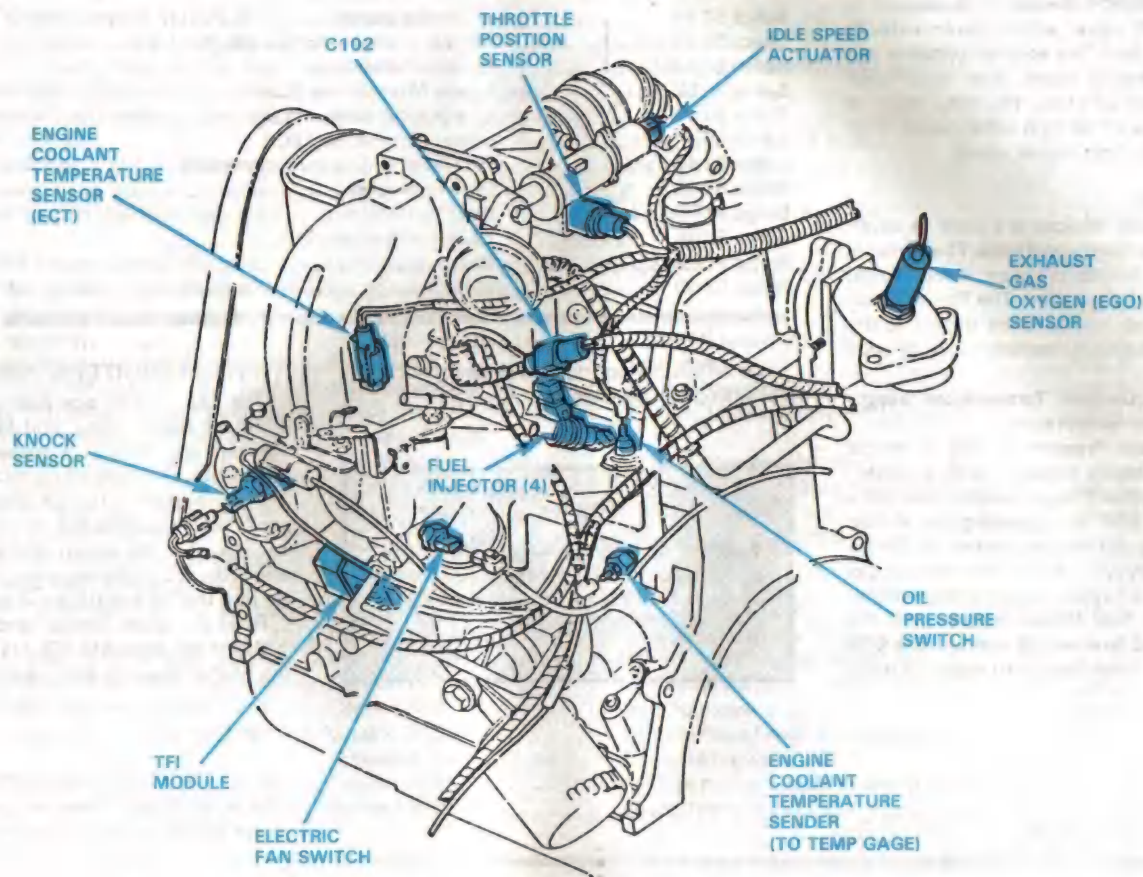


Figure 1 - Engine Wiring, LH Side

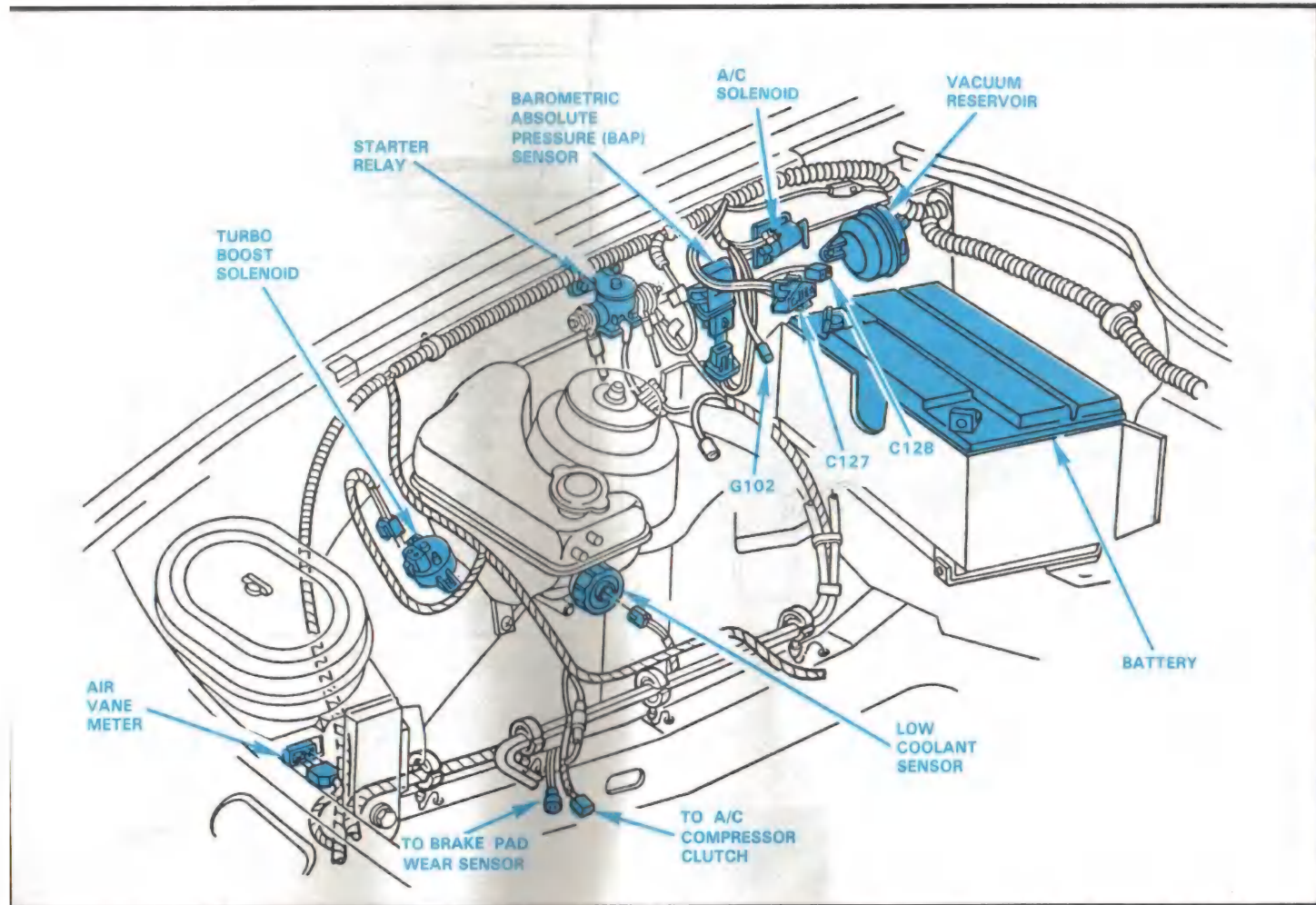


Figure 2—RH Fender Apron Wiring

34 ELECTRONIC ENGINE CONTROL

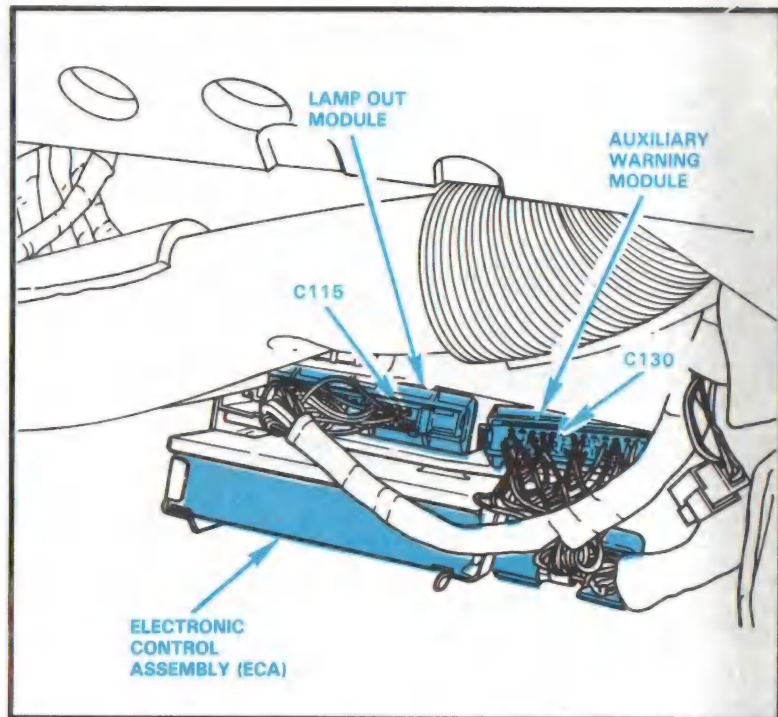


Figure 3—Electronic Control Assembly

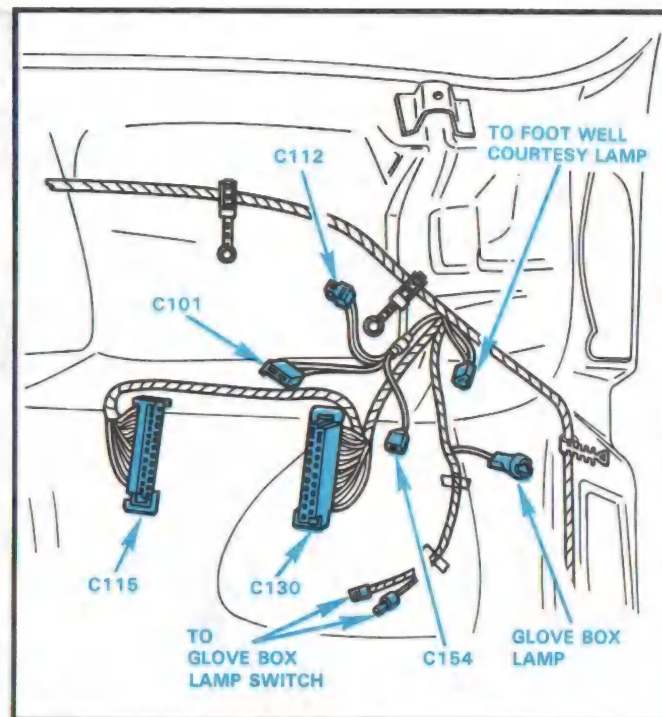
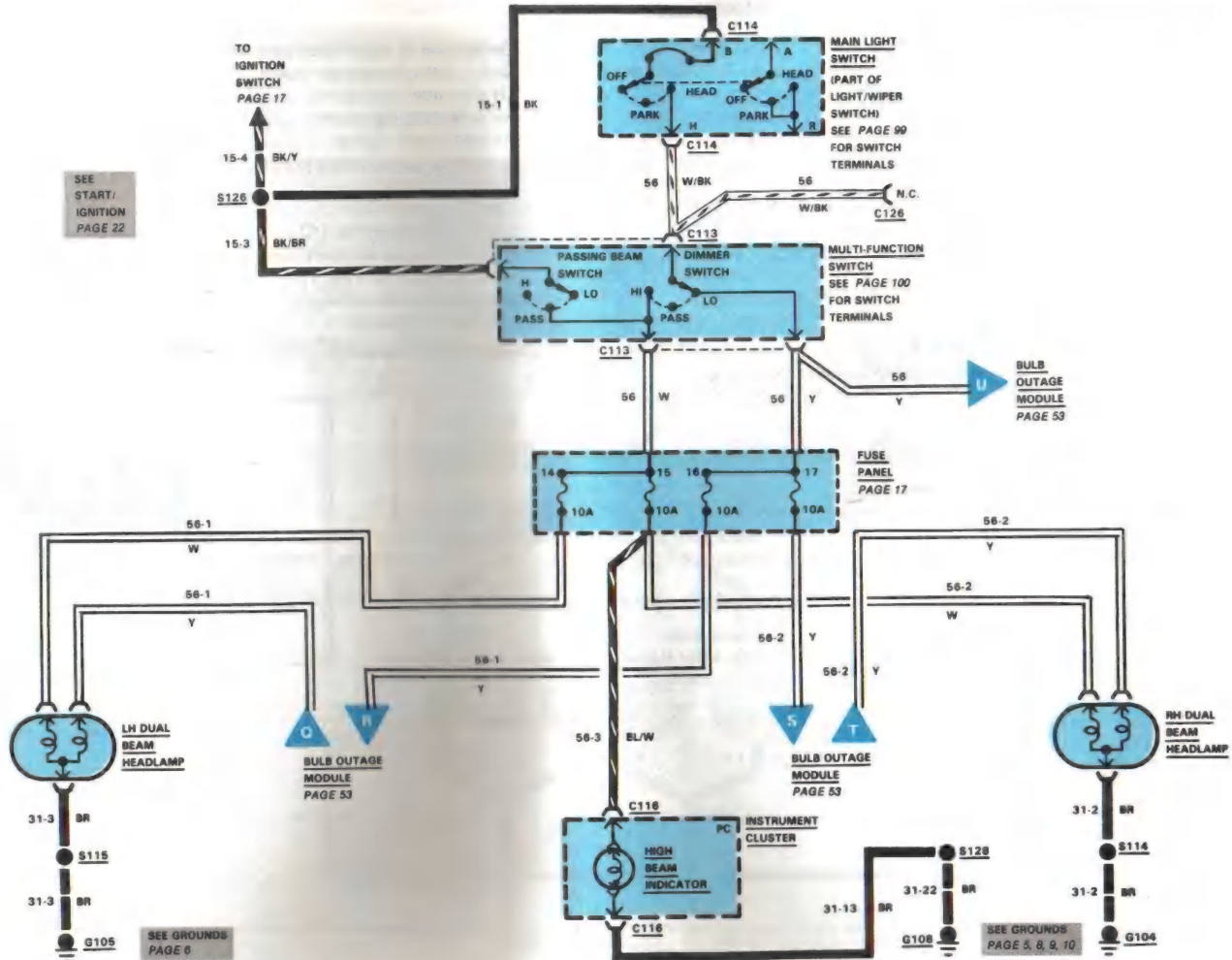


Figure 4—RH Cowl Wiring



36 HEADLAMPS

HOW THE CIRCUIT WORKS

Power to operate the **Headlamps** normally flows through the **Main Light Switch**, the lever on the RH side of steering column; and the **Dimmer Switch**, the lever on the LH side of steering column, providing power to Fuses 16 and 17. Current then flows through the outage module, which monitors **LO** beam lamp operation only, and then to the **LO** beam lamps. When the **Dimmer Switch** is pulled towards the driver, the passing beam switch closes, providing power to Fuses 14 and 15. Current then flows to the **HI** beam lamps.

TROUBLESHOOTING HINTS

NO HEADLAMPS (HI AND/OR LO)

- Check Fuses 14, 15, 16 and 17.

NO HEADLAMPS: PASSING BEAM OK

- Check for voltage at **W/BK** wire of **Multi-Function Switch**. If bad, check continuity of wire and **Main Light Switch**.
- Check continuity of dimmer switch. Replace if bad.

HEADLAMPS OK; NO PASSING BEAM

- Check for voltage at **BK/BR** wire of **Multi-Function Switch**.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Main Light Switch	On RH side of steering column	36-1		
Multi-Function Switch	On LH side of steering column	40-2		
Connector C113	LH side steering column	13-3	BK	4
Connector C114	RH side steering column	36-1	BK	8
Connector C116	At instrument cluster	46-1	BK	13
Ground G104	RH side engine compartment, near parking lamp			
Ground G105	Near LH flasher T/O	12-1		
Ground G108	LH side near foglamp T/O	13-3		
Splice S114	RH front engine compartment			
Splice S115	LH side engine compartment			
Splice S126	LH side of steering column			
Splice S128	LH side along frame			

- Check continuity of passing beam switch.

NO HI AND LOW BEAM ON ONE SIDE

- Make sure ground connection on that side is clean and tight.

ONE HEADLAMP DOES NOT WORK

- Check bulb.
- Check for frayed or damaged wires, or loose connections.

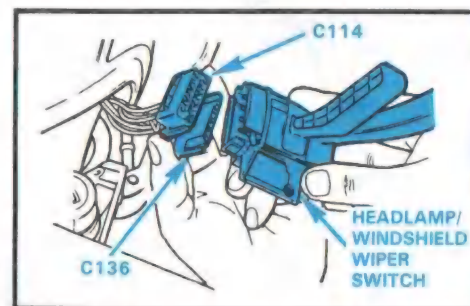


Figure 1 — Headlamp/Wiper Switch

38 EXTERIOR LAMPS

HOW CIRCUIT WORKS

Power is supplied to the **Main Light Switch** from **Fuse Link B**. Current then flows through Fuses 18 and 19 to the marker, parking and license lamps.

TROUBLESHOOTING HINTS

NO EXTERIOR LAMPS WORK

- Look for frayed or damaged wires, or loose connections.
- Make sure **C114** and connector at **Bulb Outage Module** are tight.
- Check for voltage at **R** wire of **Main Light Switch**. If bad, check harness back to **Battery**.

ONE LAMP DOES NOT WORK

- Check bulb.
- Check for frayed or damaged wires, or loose connections.

RH LAMPS DO NOT WORK

- Check **Fuse 19**

LH LAMPS OR LICENSE LAMPS DO NOT WORK

- Check **Fuse 18**

COMPONENT LOCATION

		Page- Figure	Color	Terminals
Main Light Switch	RH side steering column	36-1		
Connector C114	RH side steering column	36-1	BK	8
Ground G101	Near license lamps			
Ground G104	RH side engine compartment, near parking lamp			
Ground G105	Near LH flasher T/O	12-1		
Splice S107	Near rear window wiper motor			
Splice S114	RH front engine compartment			
Splice S115	LH side engine compartment			
Splice S138	Near rear wiper switch T/O			
Splice S139	Near rear wiper switch T/O			
Splice S141	Near windshield washer bottle			
Splice S142	Near RH parking lamp T/O			

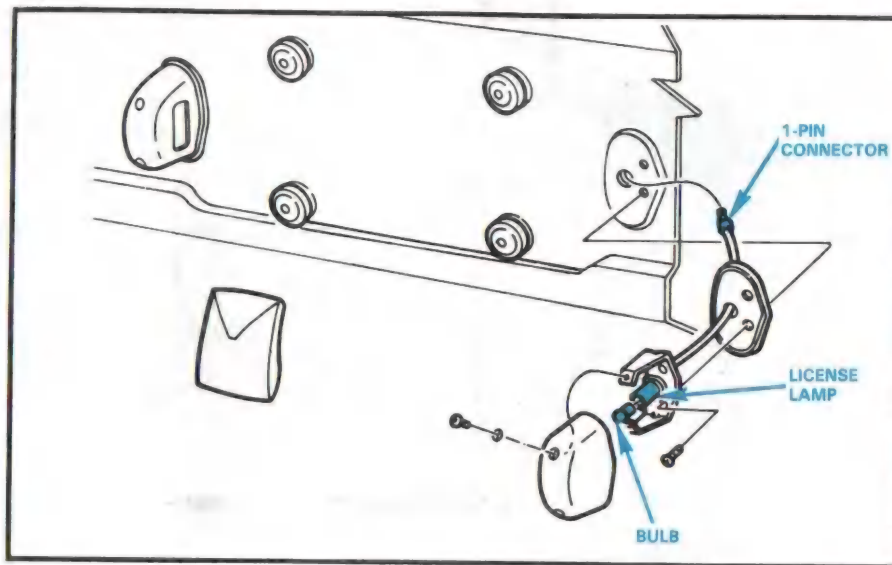
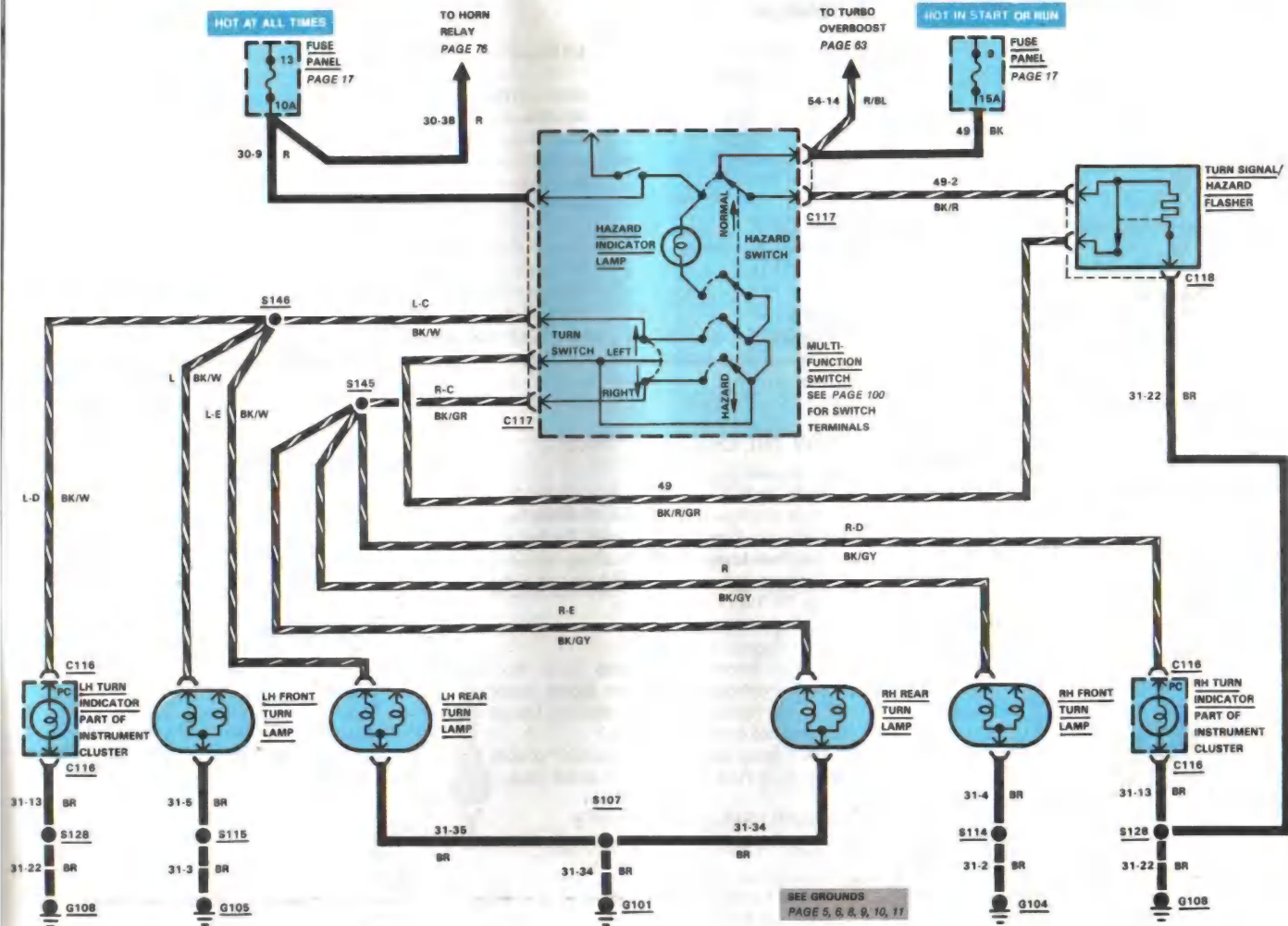


Figure 1 — License Lamps



40 TURN/HAZARD LAMPS

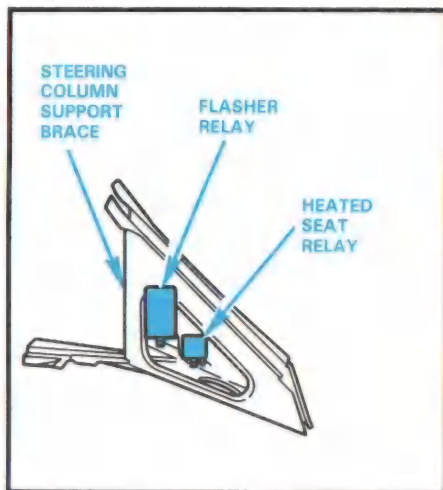


Figure 1 — Steering Column—Relay Locations

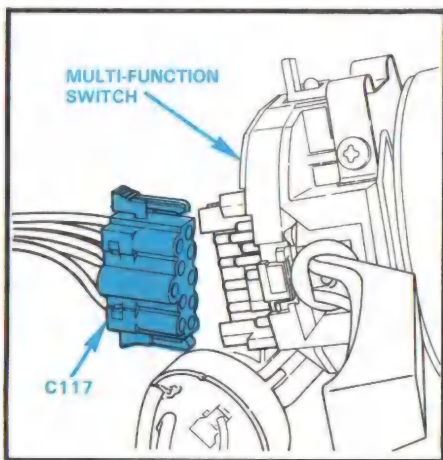


Figure 2 — Multi-Function Switch

COMPONENT LOCATION

	Page-Figure	Color	Termin
Multi-Function Switch	LH side and top of steering column	40-2	
Turn Signal/Hazard Flasher	Behind LH side of I/P		
Connector C116	At instrument cluster	46-1	BK 13
Connector C117	At turn signal stalk switch	40-2	BK 10
Connector C118	At turn signal/hazard flasher	13-3	BK 3
Ground G101	Near license lamps		
Ground G104	RH side engine compartment, near parking lamp		
Splice S107	LH rear panel, near taillamp		
Splice S115	LH engine compartment		
Splice S128	LH side of frame		
Splice S145	Behind LH side of I/P		
Splice S146	Behind LH side of I/P		

HOW THE CIRCUIT WORKS

Turn Signals

With the Ignition Switch in RUN and START, current can flow through Fuse 9, Multi-Function Switch, the Turn Signal/Hazard Flasher and on to the Turn Lamps and indicators.

The turn switch sends the power to either the LH or RH Turn Lamps.

Hazard Flasher

Current flows through Fuse 13 to the Turn Lamps and Hazard and Turn Signal indicators when the hazard switch located on top of the steering column is pushed in.

The hazard switch sends current to both the RH and LH Turn Lamps at the same time.

- Replace **Multi-Function Switch**.
- Check if **Turn Signals** are flashing ON and OFF. If not, replace **Turn Signal/Hazard Flasher**.

TURN INDICATORS DON'T WORK

- Check **Fuse 9**.
- Check voltage at **BK/R** wire at **Multi-Function Switch** wire.
- Replace **Multi-Function Switch**
- Check if **Hazards** are working properly. If not, replace **Turn Signal/Hazard Flasher**.

NO FRONT OR REAR LAMPS

- Check ground points are tight and not corroded.

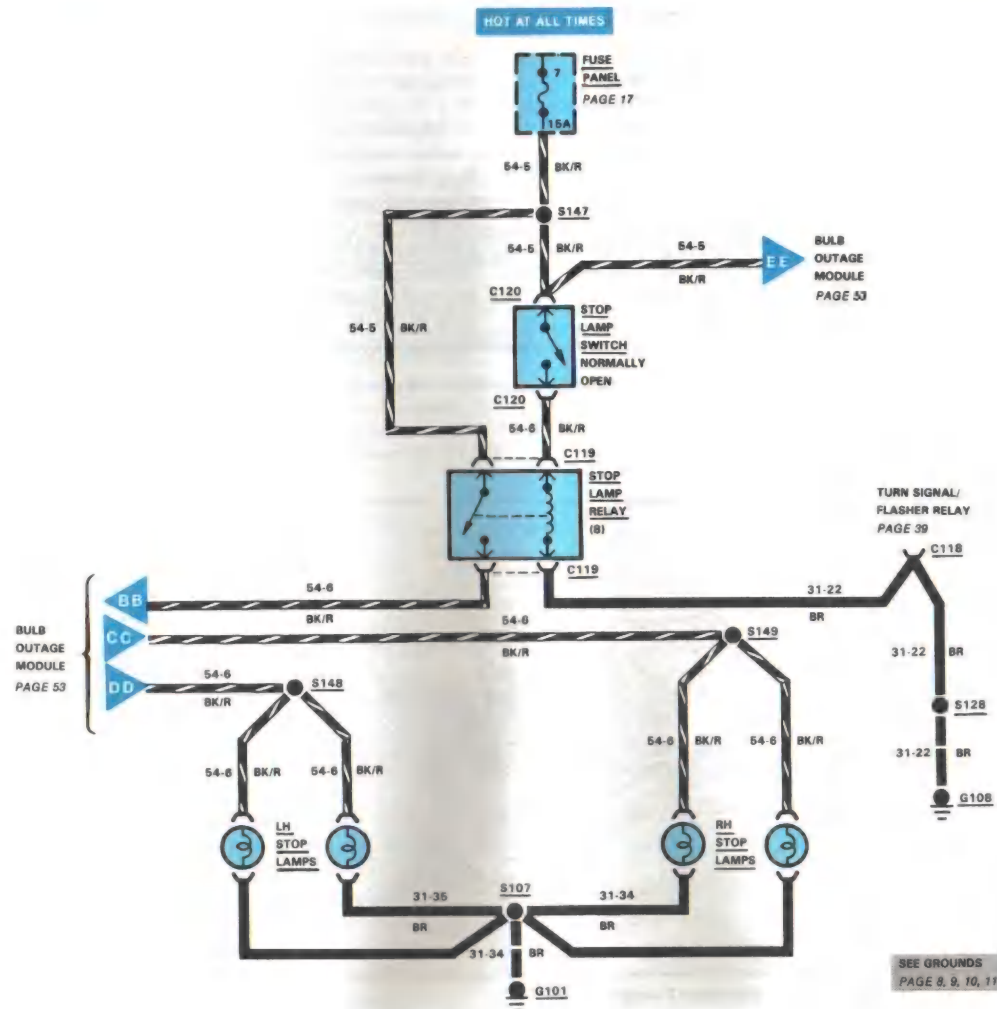
ONE TURN LAMP NOT OPERATING

- Check for burned-out bulb.
- Check voltage and ground at bulb socket.
- Check for frayed and damaged wires.
- Check that connectors are not corroded.

TROUBLESHOOTING HINTS

HAZARD FLASHER DOESN'T WORK

- Check **Fuse 13** by operating **Horn**.
- Check voltage at **C117 BK/R** wire at **Multi-Function Switch**.



42 STOPLAMPS

HOW THE CIRCUIT WORKS

Current flows through **Fuse 7** to the **Stoplamp Switch** and **Relay**. When the **Stoplamp Switch** is closed, the **Stoplamp Relay** is energized and current flows through the **Bulb Outage Module** and then to the **Stoplamps**.

TROUBLESHOOTING HINTS

BOTH STOPLAMPS DON'T WORK

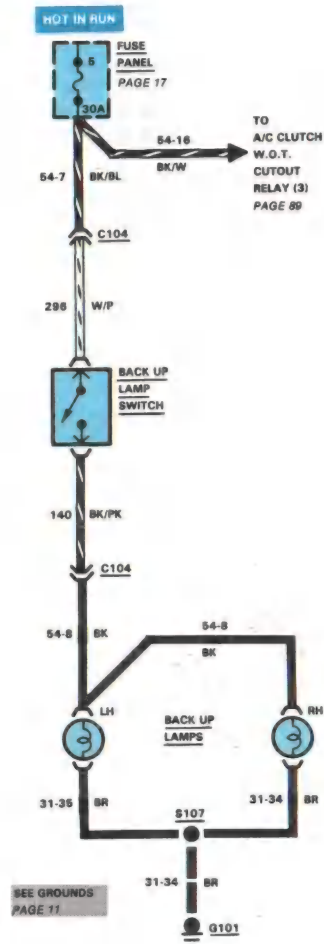
- Check **Fuse 7**.
- With **Stoplamp** switch closed, check voltage at **C119 BR** wire.
- Check **G108** for tight connection.

ONE STOPLAMP DOES NOT WORK

- Check bulb.
- Check for frayed or damaged wires, or loose connections.

COMPONENT LOCATION

		Page-Figure	Color	Termir
Stoplamp Relay	In relay/fuse panel RLY VIII			
Stoplamp Switch	Attached to brake pedal arm			
Connector C118	At turn signal/hazard flasher	13-3	BK	3
Connector C119	At stoplamp relay	13-3	BK	5
Connector C120	At stoplamp switch	13-3	BK	2
Ground G101	Near license lamps			
Ground G108	LH side I/P near foglamp switch T/O	13-3		
Splice S107	LH rear panel, near hatch			
Splice S128	LH side along frame			
Splice S147	Near stoplamp switch			
Splice S148	Near LH tail lamp			
Splice S149	Near RH tail lamp			



COMPONENT LOCATION

		Page-Figure	Color	Terminals
Backup Lamp Switch	Part of transmission assembly	43-1		
Connector C104	Beneath center of vehicle, near transmission	43-1		
Splice S107	LH rear panel, near liftgate			4
Ground G101	Near license lamps			

HOW THE CIRCUIT WORKS

Current flows through **Fuse 5** to the **Backup Lamp Switch** and then to the **Backup Lamps**.

TROUBLESHOOTING HINTS

NO BACKUP LAMPS WORK

- Check **Fuse 5**.
- Separate **C104**. With Ignition Switch in RUN and engine off, put gearshift in REVERSE. Check continuity of the **Backup Switch** between W/P and BK/PK wires.

ONE BACKUP LAMP WILL NOT WORK

- Check bulb.
- Check bulb socket for corrosion.
- Check voltage at bulb socket.
- Check continuity to ground.

BACKUP LAMPS STAY ON

- Check **Backup Switch**. (Section 32-20 of Shop Manual.)

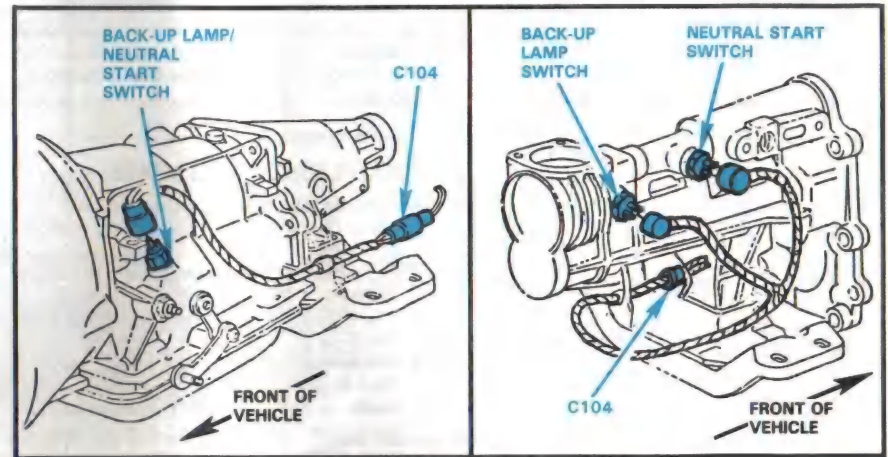
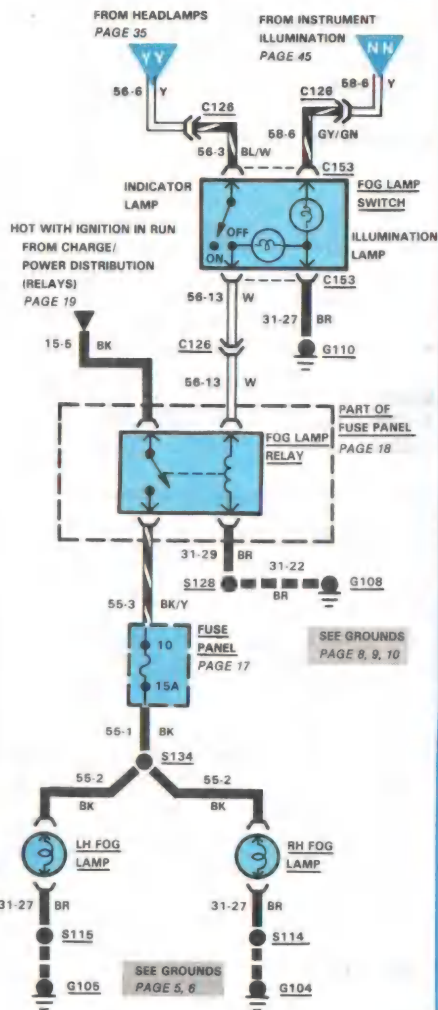


Figure 1—Back-Up Lamp/Neutral Start Switch



COMPONENT LOCATION

	Page-Figure	Color	Ter
Fog Lamp Relay	At fuse panel		
Fog Lamp Switch	LH side of I/P		
Connector C126	LH side behind I/P	13-3	BK
Connector C153	At fog lamp switch	13-3	
Splice S114	RH front engine compartment		
Splice S115	LH engine compartment		
Splice S128	LH side along frame		
Splice S134	Near LH fog lamp		
Ground G104	RH side engine compartment near parking lamp		
Ground G105	Near LH flasher T/O	12-1	
Ground G108	LH side I/P, near foglamp switch T/O	13-3	
Ground G110	Near fog lamp switch		

HOW THE CIRCUIT WORKS

Current flows from Ignition Relay X through Fog Lamp Relay, and Fuse 10 to Fog Lamps. Fog Lamp Relay is controlled by Low-beam Headlamp voltage which provides operation of Fog Lamps only with Low-beam Headlamp operation.

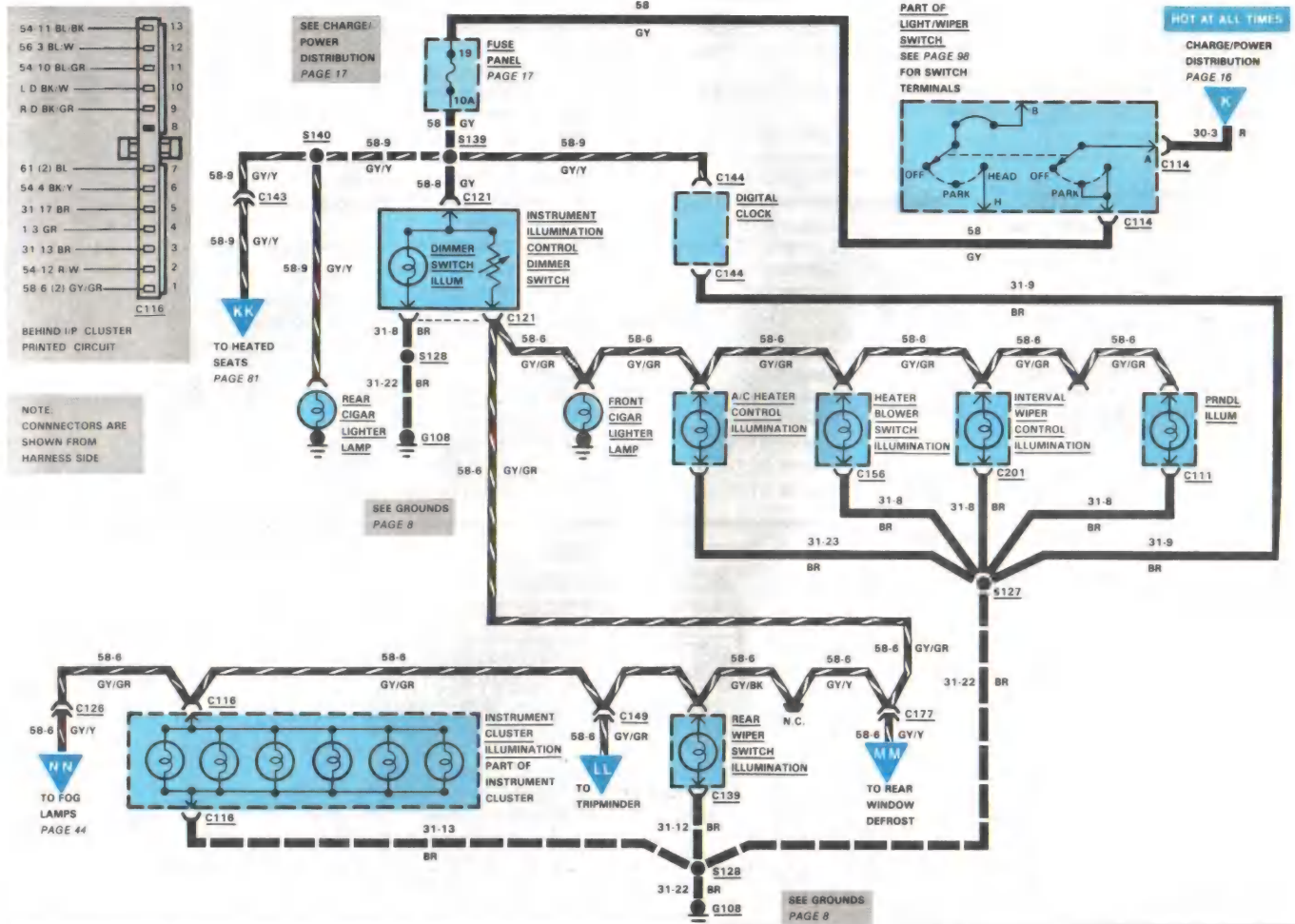
ONE FOG LAMP DOES NOT WORK

- Check bulb.
- Check voltage at 55-2.
- Check continuity to ground 31-27.
- Check for open/broken wire between bulb socket splice S134, S114 or S115.

TROUBLESHOOTING HINTS

NO FOG LAMPS WORK

- Check Fuse 10—fuse not open, voltage at 55-1.
- Check that Headlamp Switch is in low-beam position.
- Check Fog Lamp Switch—indicator lamp "on."
- Check Fog Lamp Relay—voltage at coil (56A-B), continuity through relay coil, continuity to ground (31-27), voltage at contacts, in at 15-5, out at 55-3. If coil is open or no voltage out (55-3) with voltage in, replace relay.



46 INSTRUMENT AND SWITCH ILLUMINATION

HOW THE CIRCUIT WORKS

With either the parking lamps or headlamps ON, current flows through the **Main Light Switch**, powering **Fuse 9**. Current then flows through the **Instrument Illumination Control Dimmer Switch**, illuminating the affected components or switches.

TROUBLESHOOTING HINTS

NO INSTRUMENT LAMPS WORK

- Check **Fuse 19**.
- Check for loose or corroded connections.
- Disconnect **C121** and check resistance of dimmer switch.

ONE LAMP NOT WORKING

- Check bulb and socket.
- Check continuity to ground.

COMPONENT LOCATION

Instrument Illumination

Control Dimmer

Switch	Beneath the speedometer	46-1		
Main Light Switch	RH side of steering column	36-1		
Connector C111	Beneath console	83-5		
Connector C114	RH side of steering column	36-1	BK	8
Connector C116	At instrument cluster	46-1	BK	13
Connector C121	At illumination dimmer switch	13-3	BK	5
Connector C139	At rear wiper switch	13-3	BK	5
Connector C143	Below console	67-1	BK	2
Connector C149	Behind center of I/P	87-1	BK	5
Connector C156	At heater blower switch		BK	8
Connector C177	LH side I/P	80-1	BK	4
Connector C201	At interval wiper control switch	73-1		6
Splice S127	Behind center of I/P			
Splice S128	LH side along frame			
Splice S130	Near seat belt buzzer T/O			
Splice S139	Near rear wiper switch T/O			
Splice S140	Near dual warning buzzer T/O			
Ground G108	LH side I/P, near foglamp switch T/O	13-3		
Ground G110	At foglamp switch			
Ground G114	Near heated seat relay			

Page-
Figure Color Terminals

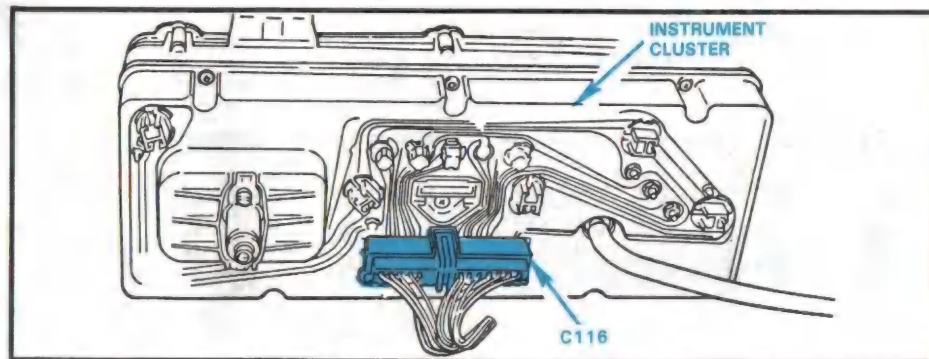
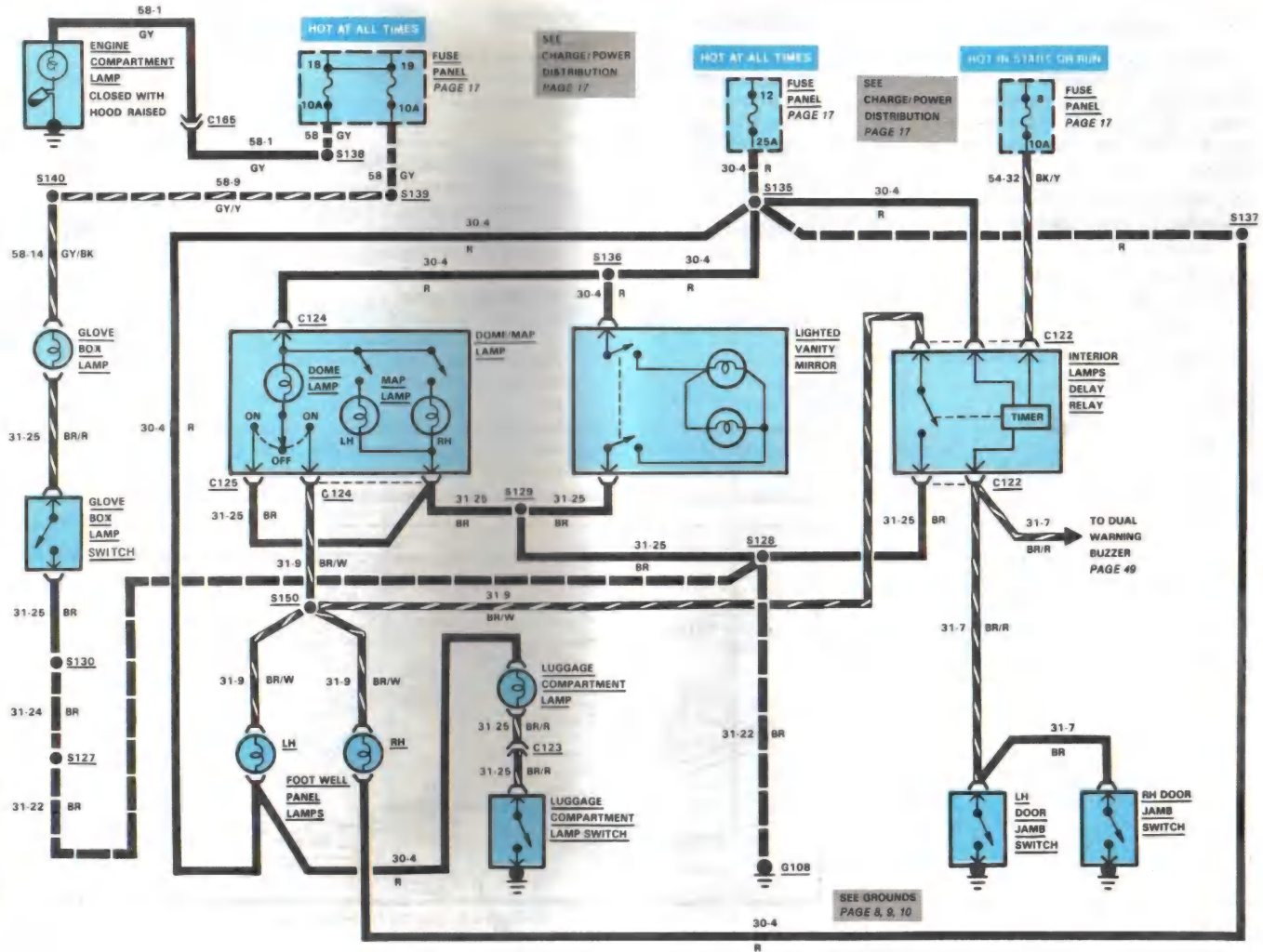


Figure 1 – Instrument Cluster



HOW THE CIRCUIT WORKS

Voltage is applied at all times through **Fuse 12** to this circuit. The **Dome** and **Cowl Panel Lamps** are grounded through the **Interior Lamps Delay Relay**. This relay continues courtesy lamp operation (for a set time), after the door has been closed.

TROUBLESHOOTING HINTS

NONE OF THE LAMPS WORK

- Check **Fuse 12**.

COWL PANEL LAMPS DON'T WORK

- Check for voltage at **C112 BR** with door open.
- Replace **Interior Lamps Delay Relay**.

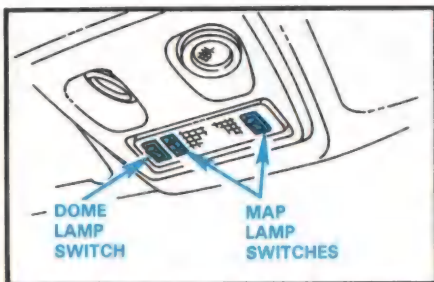


Figure 3—Dome and Map Lamp Switches

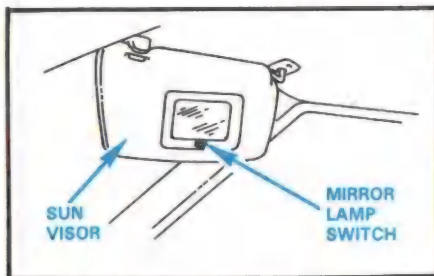


Figure 2—Lighted Vanity Mirror

COMPONENT LOCATION

	Page-Figure	Color	Terminals
Door Jamb Switches	In respective door jambs		
Engine Compartment Lamp	Attached to top of hood		
Interior Lamps Delay Relay	In fuse box		
Luggage Compartment Lamp Switch	In rear roof trim panel		
Connector C122	At interior lamp delay relay	Y	7
Connector C123	In liftgate, just right of latch	GY	2
Connector C124	At dome/map lamp		3
Connector C125	At dome/map lamp	BK	1
Ground G108	LH side I/P, near foglamp switch T/O		
Splice S127	Behind center of I/P		
Splice S128	LH side along frame		
Splice S129	Near dome/map lamp		
Splice S130	Near dual warning buzzer T/O		
Splice S135	Along LH frame, near doorajar sender		
Splice S136	Near dome/map lamp		
Splice S137	Behind center of I/P		
Splice S139	Near rear wiper switch T/O		
Splice S140	Near dual warning buzzer T/O		
Splice S150	Behind LH quarter panel, rear door post		

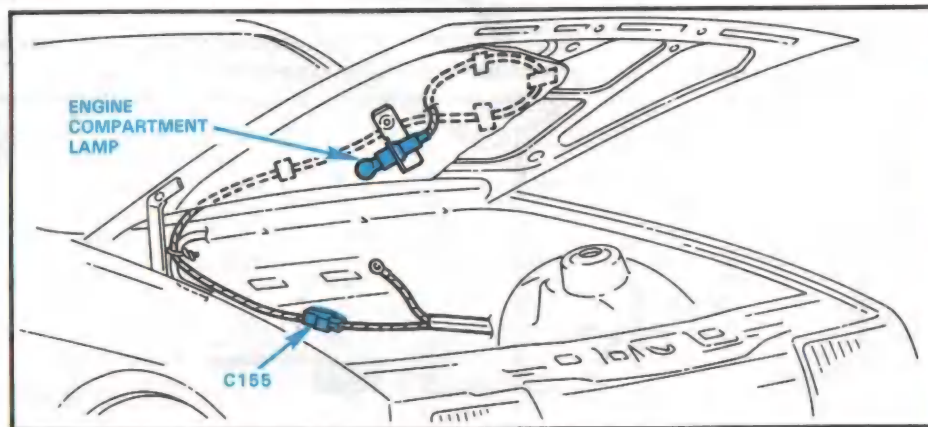
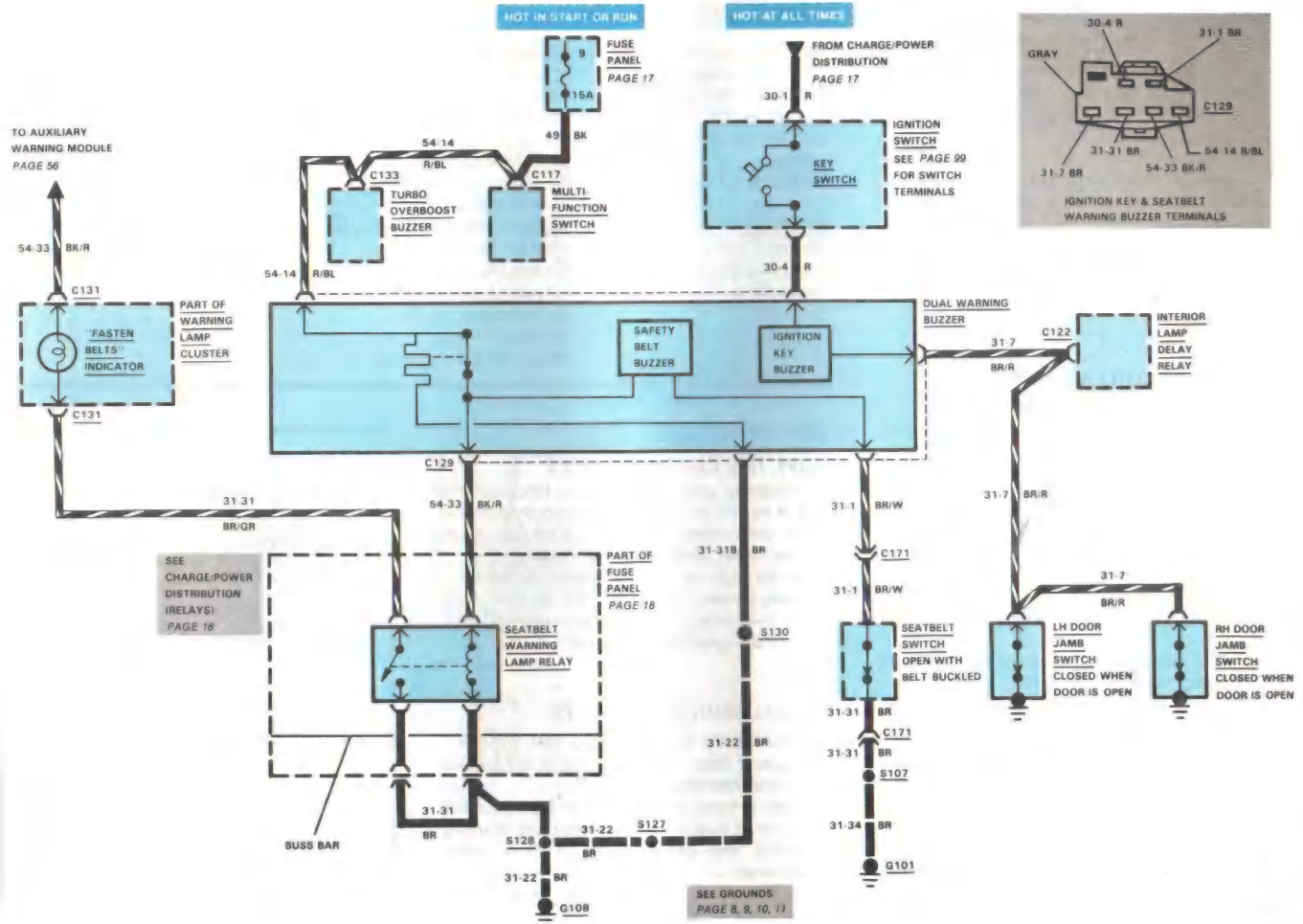


Figure 1—Engine Compartment Lamp



SEATBELT WARNING

HOW THE CIRCUIT WORKS

With the **Ignition Switch** in RUN, current flows through **Fuse 9** and the “**Fasten Belts**” **Indicator** for 4 to 8 seconds, whether belts are buckled or not. The buzzer will sound during this time only if the driver’s belt is not buckled.

A thermal time switch in the **Seatbelt Timer/Buzzer** assembly controls both the indicator and buzzer.

COMPONENT LOCATION

	Page-Figure	Color	Terminals
Warning Lamp Cluster	Center of I/P		
Door Jamb Switches	In respective door jambs		
Dual Warning Buzzer	Behind RH side I/P		
Ignition Switch	Top RH side of steering column		
Seatbelt Warning Lamp Relay	In fuse panel		
Connector C122	At interior lamp delay relay	Y	7
Connector C129	At dual warning buzzer	GY	7
Connector C131	At warning lamp cluster	BK	7
Ground G101	Near license lamps		
Ground G108	LH side I/P, near foglamp switch T/O		13-3
Splice S107	LH rear panel, near liftgate		
Splice S127	Behind center of I/P		
Splice S128	LH side along frame		
Splice S130	Near dual warning buzzer T/O		

TROUBLESHOOTING HINTS

NO SEATBELT WARNING OPERATION

- Check **Fuse 9** by operating Turn Signal Indicator, with **Ignition Switch** on.
- Check for voltage at **R/BL** wire of buzzer.

INDICATOR DOESN'T GO ON

- Check indicator bulb in **Warning Lamp Cluster**.
- Check for voltage at **BK/R** and **BR/GR** wire of **Seatbelt Warning Lamp Relay** when buzzer is on.
- Check continuity from **BR** wire of **Seatbelt Warning Lamp Relay** **G108**.
- Check for voltage at **BK/R** of **Warning Lamp Cluster**.
- Remove and check timer/buzzer.

BUZZER DOES NOT SOUND

- Check for continuity from **BR** wire or buzzer to **G108**.
- Check for voltage on **R/BL** wire at timer/buzzer.
- Remove and check timer/buzzer.

KEY WARNING

HOW THE CIRCUIT WORKS

Voltage is applied at all times through **Fuse Link B** to this circuit. The **Ignition Switch** and other components on this circuit are connected to the **Front Door Jamb Switches**. Current flows through the **Ignition Switch** to the **Dual Warning Buzzer**. When either the **LH** or **RH Door Jamb Switch** is closed, voltage is available to turn on the **Ignition Key Buzzer**.

TROUBLESHOOTING HINTS

KEY WARNING BUZZER DOES NOT SOUND

- If buzzer does not sound, check connection at **Dual-Warning Buzzer**.
- Apply ground to **BR/R** wire at **Dual Warning Buzzer**. If buzzer sounds, check **Key Warning Switch** and ground path to **Door Jamb Switches**.
- Check continuity at both **Door Jamb Switches**.

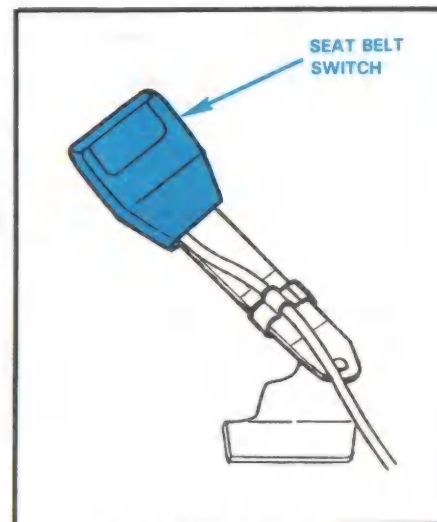
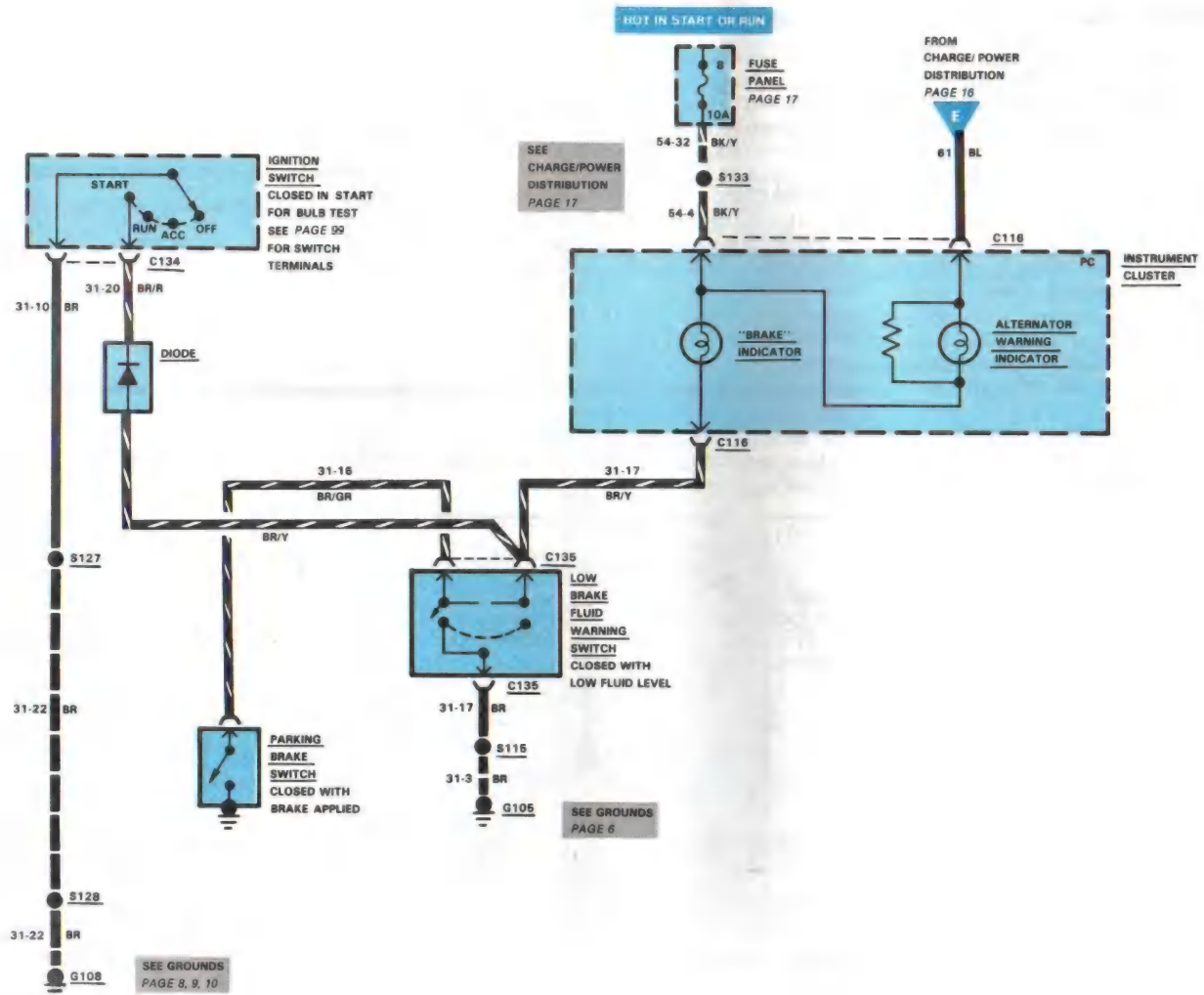


Figure 1 – Seatbelt Switch



52 WARNING INDICATORS (BRAKE, ALTERNATOR)

HOW THE CIRCUIT WORKS

The "Brake" Indicator goes on:

1. With the Ignition Switch in START, to test the bulb. (This connection is closed just before the Starter Relay pulls in.)
2. When the brake fluid is low.
3. With the Ignition Switch in RUN, if the park brake is applied.

Alternator Charge Indicator Lamp

Alternator Charge Indicator Lamp glows when there is no alternator output.

With the Ignition Switch in Start or Run, battery current flows through the Alternator Charge Indicator Lamp to the Alternator and the lamp comes On.

When the Alternator builds up enough voltage to energize a circuit in the Electronic Voltage Regulator, the Alternator Charge Indicator Lamp goes out.

COMPONENT LOCATION

	Page-Figure	Color	Terminals
Dual Brake Warning			
Switch	At brake master cylinder	52-1	
Ignition Switch	RH side of steering column		
Parking Brake Switch			
Connector C116	At instrument cluster	46-1	BK 13
Connector C134	At ignition switch	67-1	BR 6
Connector C135	At dual brake warning switch		3
Ground G105	Near LH flasher T/O	12-1	
Ground G108	LH side I/P, near foglamp switch T/O	13-3	
Splice S115	LH engine compartment		
Splice S127	Behind center of I/P		
Splice S128	LH side along frame		
Splice S133	Center of I/P, near tripminder		
Splice S135	Along LH frame, near door post		

ANY WARNING INDICATOR DOESN'T GO ON

- Check bulb. Check continuity from printed circuit to ground.
- Check for voltage at BK/Y wire of printed circuit.
- Replace printed circuit.

TROUBLESHOOTING HINTS

ALTERNATOR CHARGING INDICATOR LAMP STAYS ON AFTER VEHICLE IS STARTED

- Check Fuse Link B at Starter Relay.
- Check Alternator Belt tension.
- Check Battery terminals and cable clamps.
- Check for clean and tight connections on Alternator, and Starter Relay.
- For further diagnosis refer to Shop Manual Section 31-01.

ANY WARNING INDICATOR STAYS ON WHEN SYSTEMS ARE NORMAL

- Check for faulty switch.
- Check for shorts to ground in wiring between printed circuit and switch.

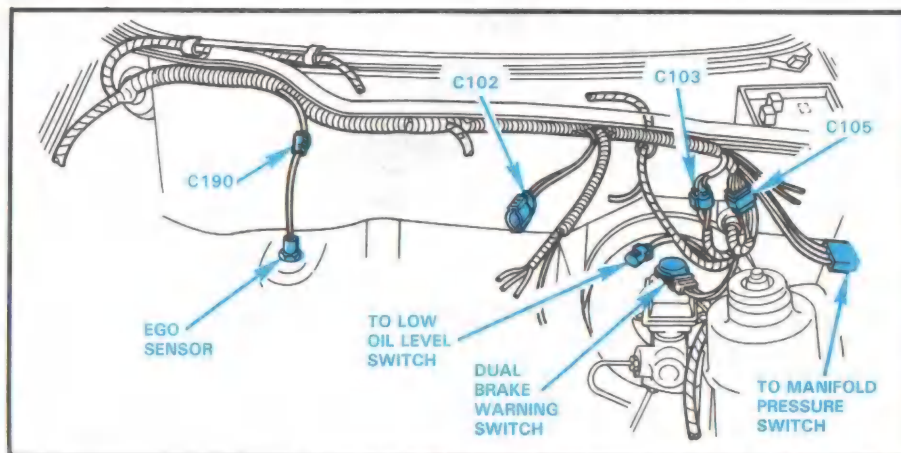
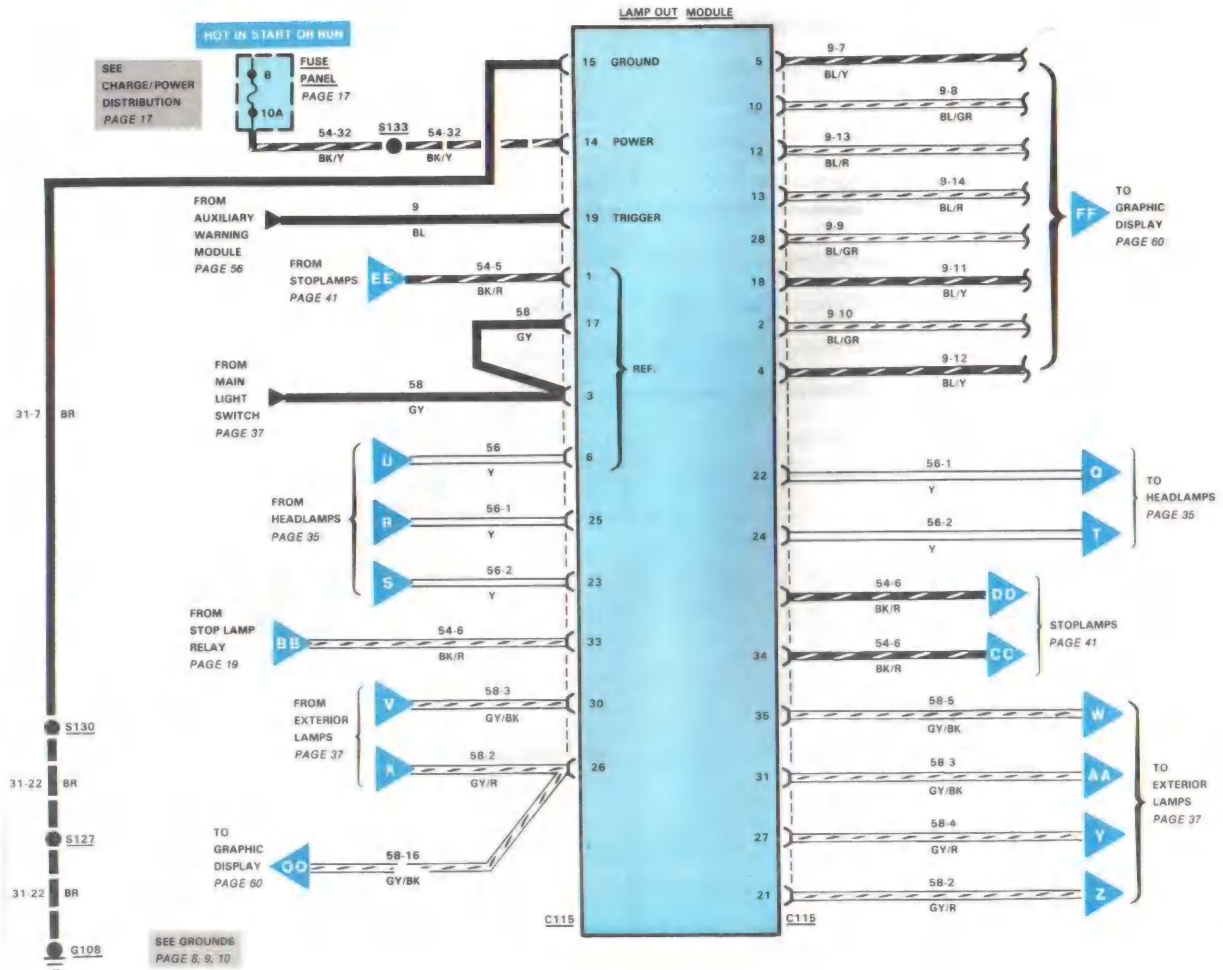


Figure 1 — LH Dash Panel Wiring



54 LAMP OUT WARNING

HOW THE CIRCUIT WORKS

The **Lamp Out Module** monitors the **Low Beam Headlamps, Stoplamps, Taillamps** and **Parking Lamps**. The **Lamp Out Module** receives inputs from these circuits and displays any bulb outages on the **Graphic Display**.

TROUBLESHOOTING HINTS

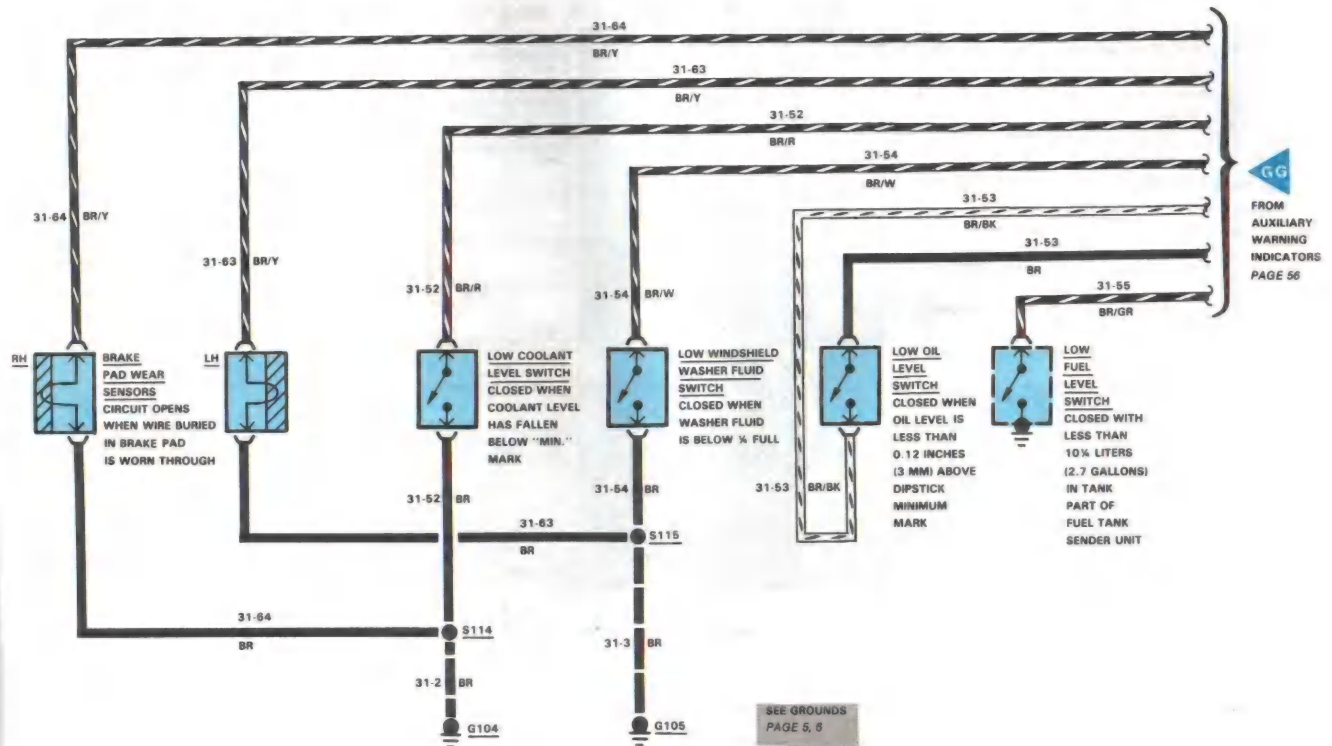
IF SYSTEM MALFUNCTIONS

Test **Lamp Out Module** operation with the **Ignition Switch** in **START**. If any lamp out indicator in the **Graphic Display** fails to illuminate, replace bulb. If **Graphic Display** is OK, check connections and repair or replace **Lamp Out Module**.

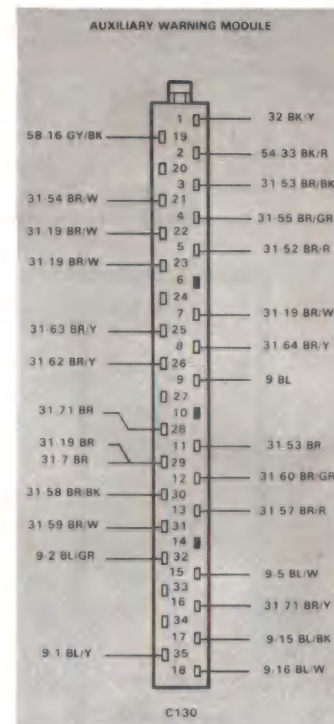
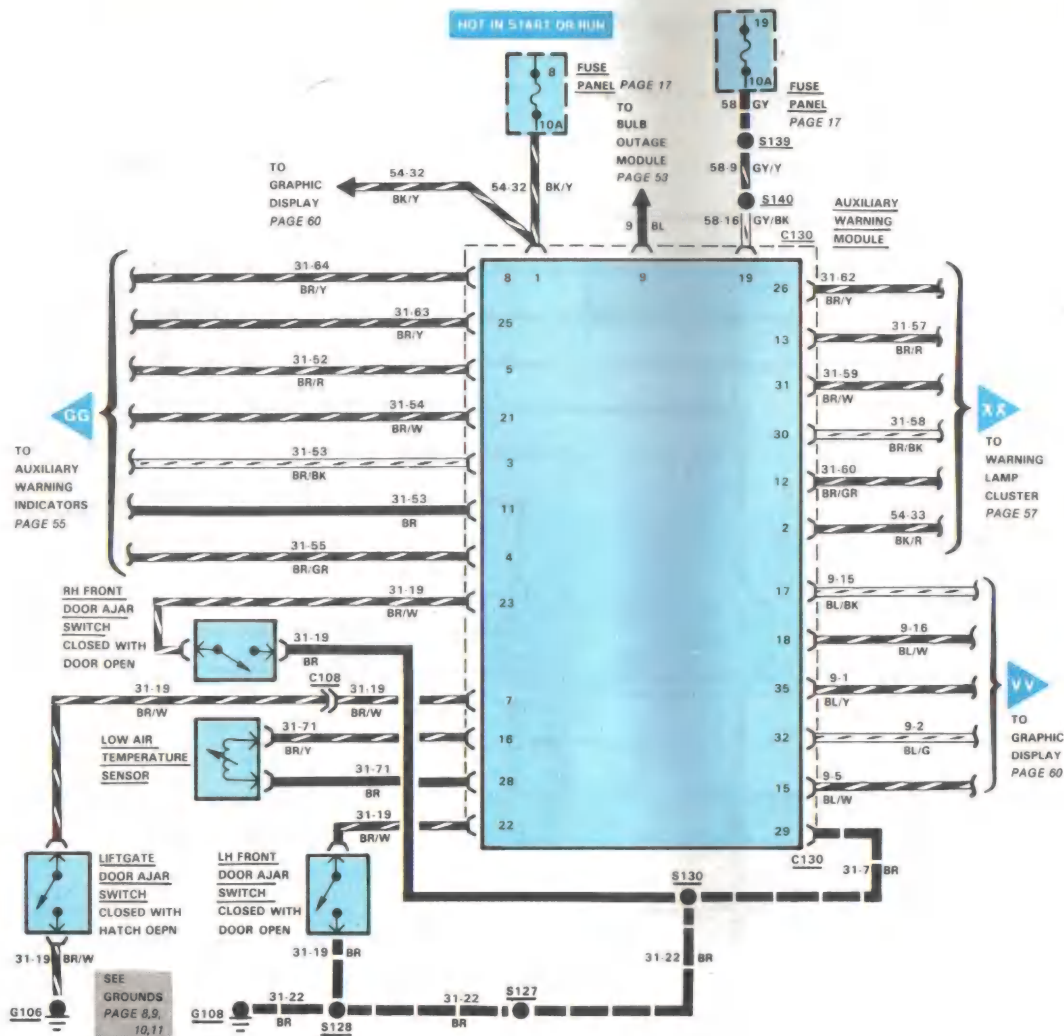
- Check **Fuse 8** and voltage on circuit **54-32 (BK/Y wire)**.
- If one circuit does not work, check continuity of wires. Replace or repair as required.

COMPONENT LOCATION

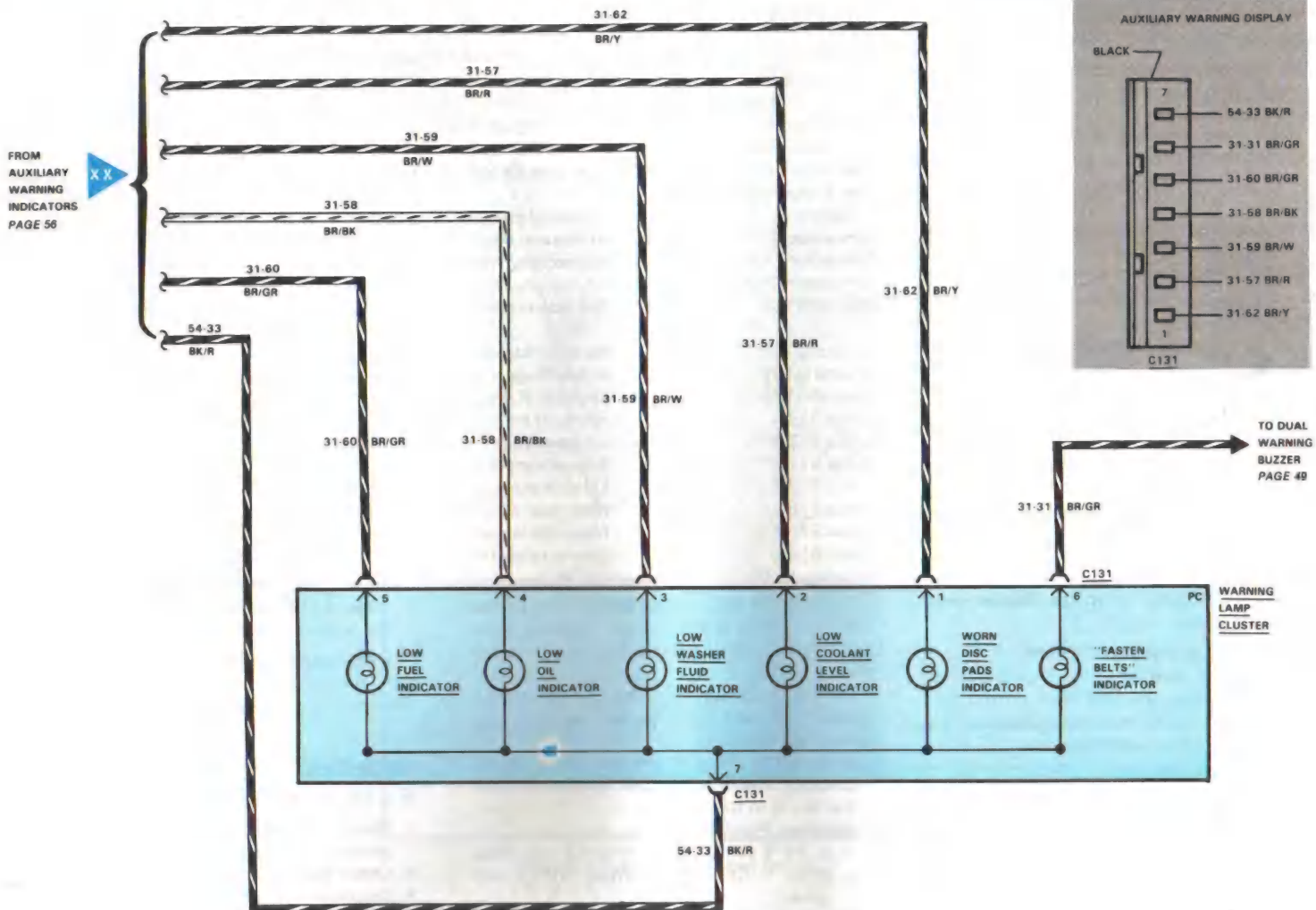
		Page- Figure	Color	Terminal
Lamp Out Module	RH cowl panel			
Connector C115	At lamp out module	67-3	BR	15
Ground G108	LH side I/P near foglamp switch T/O	13-3		
Splice S127	Behind center of I/P			
Splice S130	Near dual warning buzzer T/O			
Splice S133	Center of I/P, near tripminder			



56 AUXILIARY WARNING INDICATORS



AUXILIARY WARNING INDICATORS 57



58 AUXILIARY WARNING INDICATORS

HOW THE CIRCUIT WORKS

AUXILIARY WARNING SYSTEM

This warning system consists of the **Auxiliary Warning Module**, the **Graphic Display Module** and six warning lamps.

These lamps will glow for approximately five seconds after the **Ignition Switch** is turned to the ON position to allow for a visual check of the lights.

If all systems are acceptable, the lamps will go out.

Should a lamp continue to flash off and on for half a minute and then go out, a circuitry fault may exist.

FRONT BRAKE PAD WARNING LAMP

This lamp will glow when a front disc brake inner pad has worn to a 2 mm (0.079 inch) thickness. The pads must be replaced as soon as possible.

ENGINE COOLANT WARNING LAMP

Indicate the coolant level in the **Coolant Reservoir** has fallen below the MIN mark.

LOW WINDSHIELD WASHER FLUID LEVEL WARNING LAMP

This lamp will glow when the **Washer Fluid Reservoir** is below 1/4 full.

LOW ENGINE OIL WARNING LAMP

This lamp will glow when the engine oil level has nearly reached the MIN mark on the dipstick. A false warning may occur if the vehicle is started on a steep grade or slope.

LOW FUEL LEVEL WARNING LIGHT

When the fuel level is approximately 1/8 of a tank, this warning lamp will flicker or steadily glow.

SEAT BELT WARNING LAMP AND CHIME


This lamp will glow and a chime will sound when the **Ignition Switch** is turned to the ON position to remind you to fasten your seat belt. It will extinguish after approx. 8 seconds.

COMPONENT LOCATION

	Page- Figure	Color	Terminals
Brake Pad Wear Sensors			
Door Ajar Switches			
Low Air Temperature Sensor			
Low Coolant Level Switch			
Low Fuel Level Switch			
Low Oil Level Switch			
Low Windshield Washer			
Switch			
Connector C108			
Connector C130			
Connector C131			
Ground G104			
Ground G105			
Ground G106			
Ground G108			
Splice S114			
Splice S115			
Splice S127			
Splice S128			
Splice S130			
Splice S139			
Splice S140			
Inside respective disc pads			
Near respective door latch striker			
Behind RH side of front bumper			
In coolant reservoir	59-1		
Part of fuel sender unit in fuel tank			
In engine oil pan			
In windshield washer reservoir	25-3		
In liftgate, near door latch	80-1	BK	1
At auxiliary wiring module	34-4	BR	35
At warning lamp cluster		BK	7
RH side engine compartment near parking lamp			
Near LH flasher T/O	12-1		
In hatch, near liftgate	12-2		
LH side I/P, near foglamp switch T/O	13-3		
RH front engine compartment			
LH front engine compartment			
Behind center of I/P			
LH side along frame			
Near dual warning chime T/O			
Near rear wiper switch T/O			
Near dual warning chime T/O			

This system also checks **Brake Pedal Switch** operation. This **Brake System Warning Lamp** will stay on until the **Brake Pedal** is depressed once.

The individual warning lamps on the **Graphic Display** will also glow under the following operating conditions:

- When either door or the rear hatch is not properly closed (the **Buzzer** will also sound if the key is in the **Ignition**).
- Imminent Frost Conditions:
 - at 38°F (4°C) the warning ICE will glow.
 - at 32°F (0°C) the warning  will glow.
- When a headlamp, parking lamp, or taillamp bulb does not light when the **Main Light Switch** is turned to Park or Headlamp position.

- When a brakelamp bulb does not light when the brake pedal is depressed.

If any warning lamp continues to glow after the condition is repaired, a fault in the **Auxiliary Warning System** may exist.

TROUBLESHOOTING HINTS

IF SYSTEM MALFUNCTIONS

- Check that connectors are clean and dry and properly engaged.
- Check **Fuse 8**.
- Disconnect C130 and check for continuity to ground from (31-7) **BR** wire, **Pin 29**.
- For further diagnosis procedures, refer to the Shop Manual, Section 33-92.

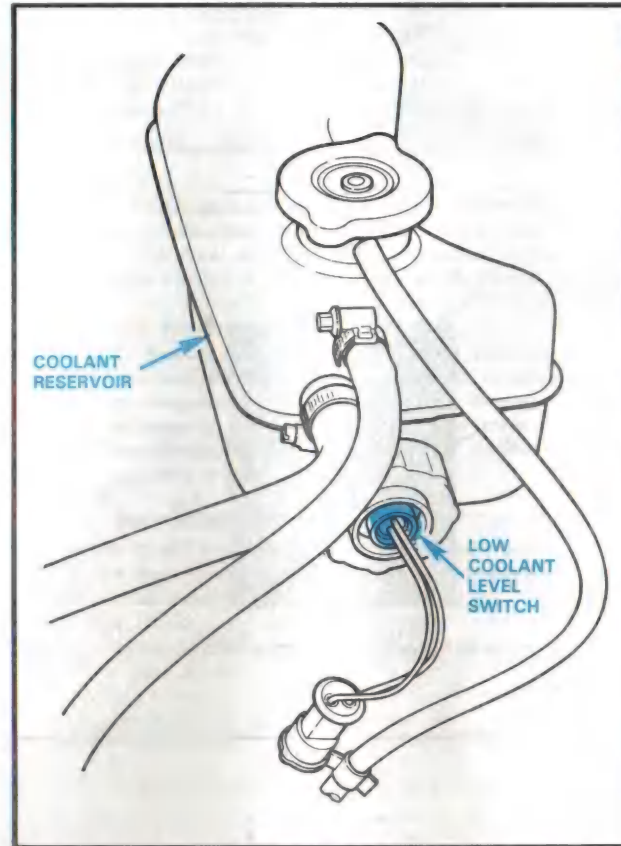
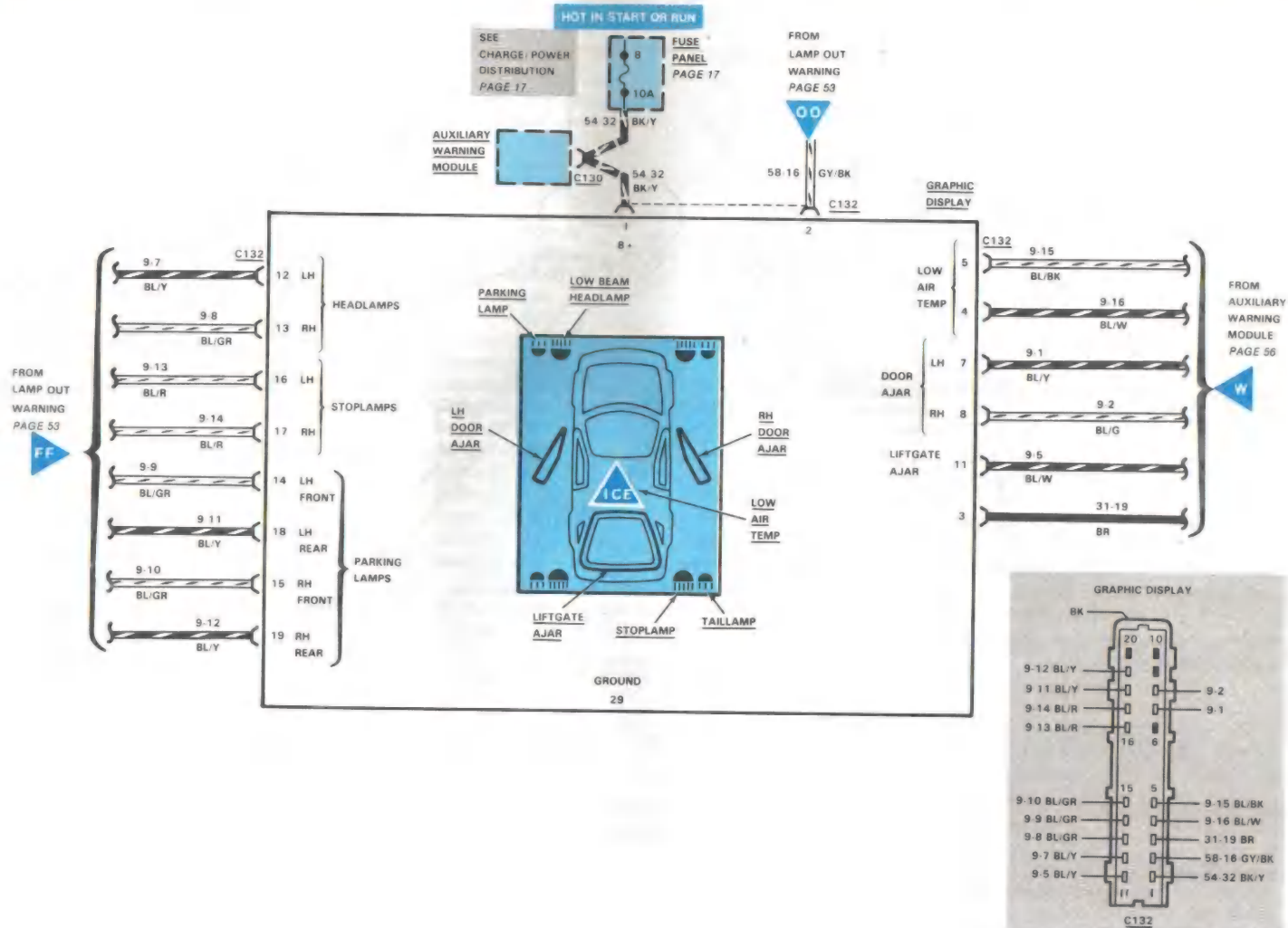


Figure 1—Low Coolant Level Switch

60 GRAPHIC DISPLAY



WARNING

This is a convenience feature. It is not designed to be a replacement or substitute for proper periodic inspection and maintenance of the vehicle.

HOW THE CIRCUIT WORKS

The **Graphic Warning Display** monitors seven functions. The seven items displayed are: **Brake Lamp**, **Tail Lamp**, low beam **Headlamp**, **Front Parking Lamp**, **Door** and **Liftgate Ajar** and **Low Air Temperature Warning**. The bulb outages are monitored by the **Bulb Outage Module** (part of the **Lamp Out Warning** system). The **Door** and **Liftgate Ajar**, and **Low Air Temp. Warning** are monitored by the **Auxiliary Warning Module**. The modules then send signals to the **Graphic Display** when these systems are not functioning properly.

When the front or rear running lamps are turned on by the **Main Light Switch** (circuit 58 GY), the **Tail Lamp** and **Front Parking Lamp** indicator will show if a bulb is burned out.

The **Headlamp** indicator will show only a headlamp low beam filament burn-out. It does not show high beam burn-out.

COMPONENT LOCATION

Graphic Display			
Connector C132	At graphic display	62-1	BK 20
Splice S127	Behind center of I/P		
Splice S128	LH side along frame		
Splice S130	Near dual warning chime T/O		

Page-
Figure Color Terminal

The **Brake Lamp** indicator will show if a brake lamp bulb is burnt out when the brake is applied.

The **Door** and **Liftgate Ajar Switches** close when a door is open or not closed completely. When any switch closes, the **Door** or **Liftgate Ajar Warning Indicator** goes on.

The **Low Air Temperature Warning Indicator** warns of possible icy road conditions by lighting up the word "ICE" when the air temperature is below 4°C (38°F) and lighting the triangle around the word "ICE" when the air temperature falls to 0°C (32°F).

TROUBLESHOOTING HINTS

- Check **Fuse 8** and voltage on the **BK/Y** wire.
- If one circuit does not work, check continuity of wires. Replace or repair as required.
- Check continuity of **BR** to **G108**.
- For detailed tests, refer to Shop Manual Section 33-50.

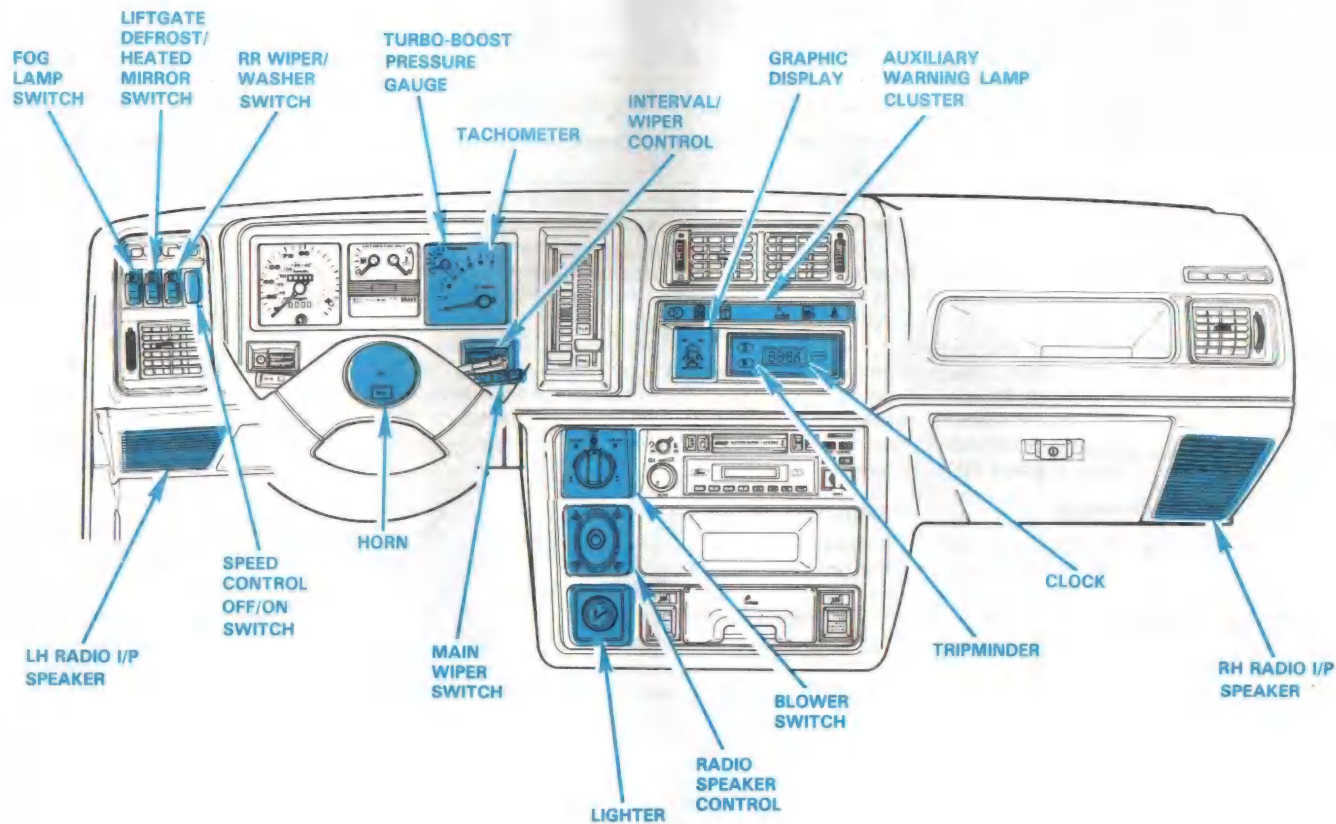
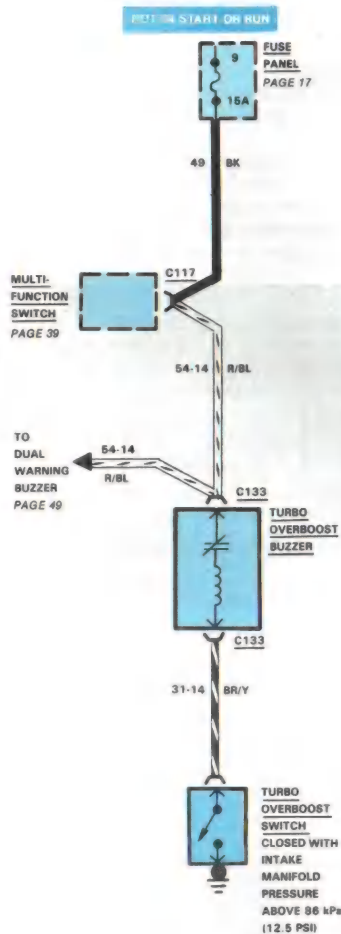


Figure 1—I/P Controls and Displays



COMPONENT LOCATION

		Page-Figure	Color	Terminals
Turbo Overboost Buzzer . . .	Behind RH side of I/P			
Turbo Overboost Switch . . .	LH fender apron	25-3		
Connector C117	At turn signal stalk switch	75-1	BK	10
Connector C133	At turbo overboost buzzer		BK	3

HOW THE CIRCUIT WORKS

When manifold pressure exceeds about 79 kPa (11.5 psi), the engine is overboosted. The turbo pressure switch closes, and the overboost buzzer sounds.

TROUBLESHOOTING HINTS

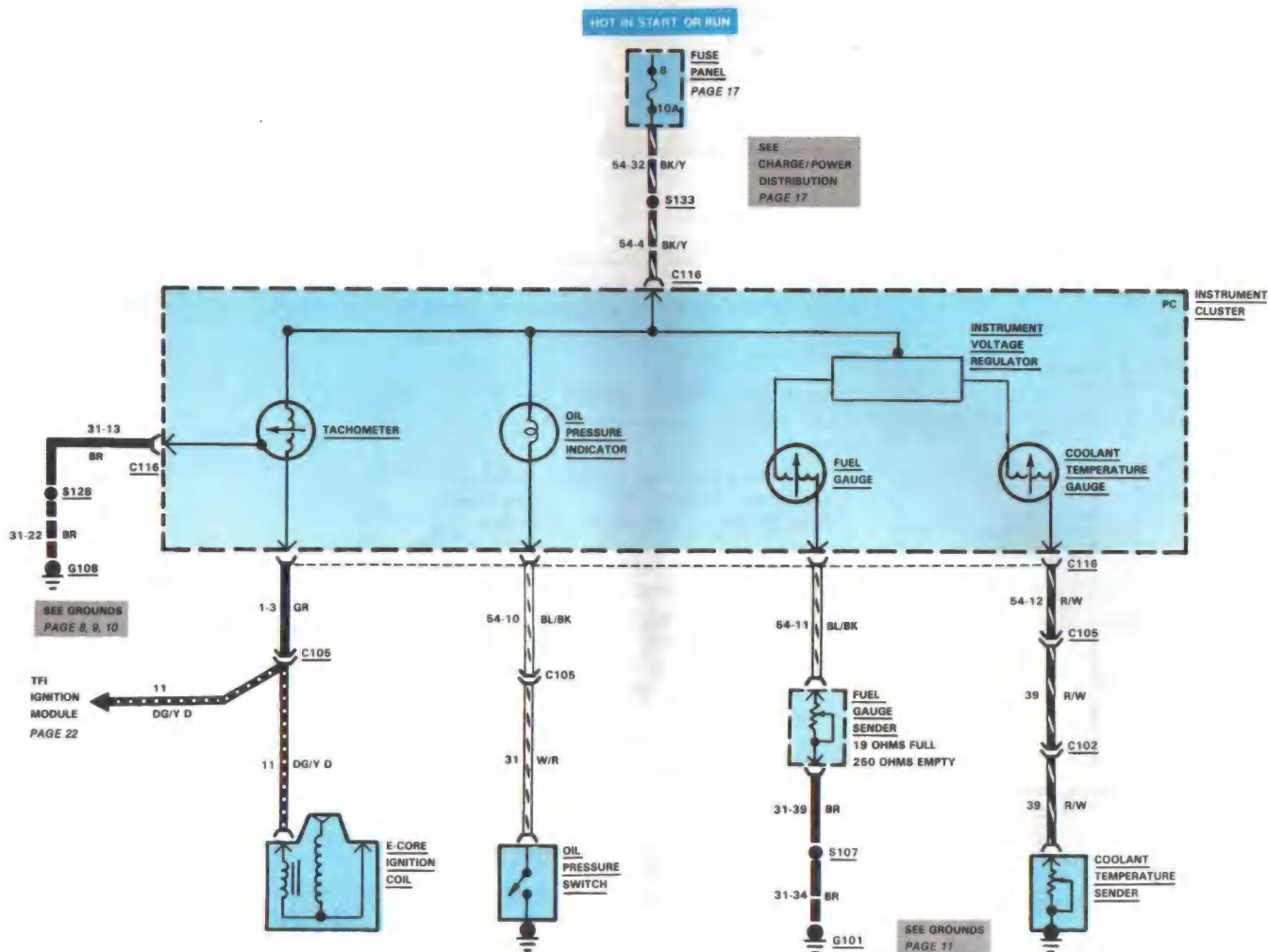
TURBO OVERBOOST BUZZER WON'T TURN OFF

- Check for short circuit in **Turbo Overboost Switch** and in **BR/Y** wire from **Turbo Overboost Buzzer** to **Turbo Overboost Switch**.

TURBO OVERBOOST BUZZER DOESN'T SOUND WHEN TURBO IS OVERBOOSTED

- Check if seatbelt buzzer sounds to check **Fuse 9**.
- Verify ground circuit from **BR/Y** at **Turbo Overboost Buzzer** to **Turbo Overboost Switch**.

64 GAUGES/TACHOMETER



HOW THE CIRCUIT WORKS

The **Fuel Gauge** connects to the **Fuel Gauge Sender**. The sender is a variable resistor connected to a float in the fuel tank. When the fuel is low, resistance is high; when fuel is high, resistance is low.

The **Coolant Temperature Gauge** connects to the **Coolant Temperature Sender**. The sender is a temperature-sensitive variable resistor. When coolant temperature is low, resistance is high; when coolant temperature is high, resistance is low.

The **Oil Pressure Warning Light** connects to the **Oil Pressure Switch**. The sender is a pressure-sensitive switch. When the oil pressure is low, the switch is closed; when the oil pressure is normal, the switch is opened.

TROUBLESHOOTING HINTS

GAUGE OUT OF CALIBRATION

- Disconnect wire from sender. Check for broken or corroded terminals.
- Test with Rotunda Instrument Gauge Tester 021-00034 using instructions.
- If Tester is unavailable, connect test light between gauge lead and ground. If light stays on or blinks erratically, replace regulator. If light won't light, check for open circuit in gauge or wiring. Normal gauge resistance is 10 to 14 ohms.
- Check gauge calibration with 19 ohm (high) and 250 ohm (low) resistors. If gauge tests within calibration, replace sender. If gauge tests out of calibration, replace gauge.

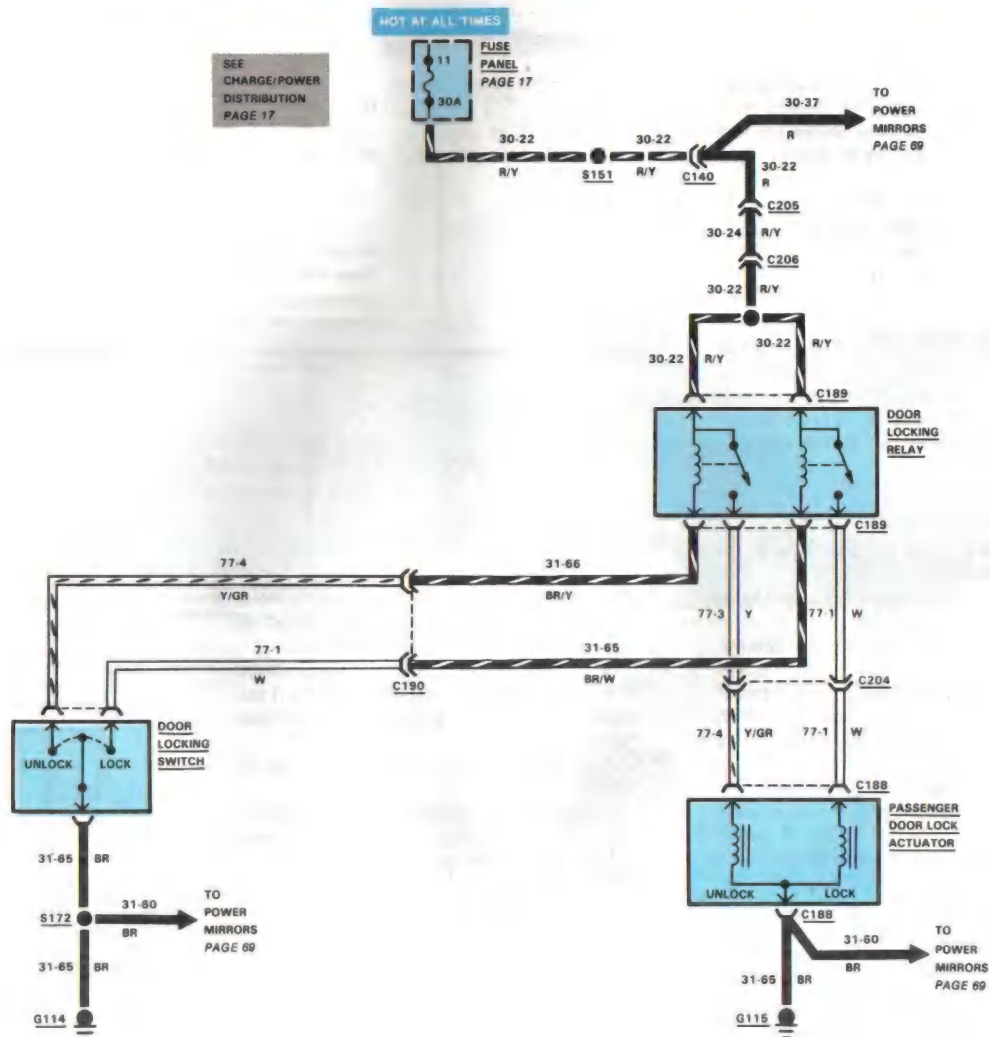
COMPONENT LOCATION

		Page-Figure	Color	Terminals
Coolant Temperature				
Sender	Rear LH side of engine	32-1		
E-Core Ignition Coil	LH fender apron	25-3		
Fuel Gauge Sender	Part of fuel pump/sender assembly inside fuel tank	87-2		
Connector C102	LH fender apron	52-1	BK	4
Connector C105	LH front side of fender apron	52-1	GY	8
Connector C116	At instrument cluster	67-1	BK	13
Ground G101	Near license lamps			
Splice S107	LH rear panel, near liftgate			
Splice S133	Center of I/P, near tripfinder			

NO TACHOMETER INDICATION

- Check **Fuse 8**.
- Check that the 4 nuts on the tach terminal studs behind the cluster, and the printed circuit connector to the cluster, are tight.
- With the **Ignition Switch** in the RUN position, check for battery voltage between the B terminal and the G terminal (as viewed from rear of cluster).
- Check for continuity from G terminal to G108.
- Disconnect the **Ignition Coil** connector. Check for continuity between the GR wire and the S terminal.

66 POWER DOOR LOCKS



HOW THE CIRCUIT WORKS

The **Power Door Locks** are powered through **Fuse 11**. The **Door Locking Relay** is energized to either lock or unlock the **Passenger Door Lock Actuator** when the **Door Locking Switch**, located on the driver's door, is switched to either lock or unlock. The **Door Locking Relay** coils are grounded through the **Door Locking Switch**. The relay contacts, then close and current is set to energize the **Passenger Door Lock Actuator**.

TROUBLESHOOTING HINTS

POWER LOCKS DON'T WORK

- Check for battery voltage at R/Y wires of **C189**.
- Check that **G114** and **G115** are clean and tight.

COMPONENT LOCATION

	Page-Figure	Color	Terminals
Door Locking Relay			
Liftgate Release Relay			
Liftgate Release Solenoid			
Liftgate Release Switch			
Passenger Door Lock Actuator			
Power Door Lock Switch	70-1		
Connector C140	67-1	BK	2
Connector C187		BK	1
Connector C188			2
Connector C189			6
Connector C190			2
Connector C204	52-1		2
Connector C205	67-2		2
Connector C206			
Ground G114			
Ground G115	67-2		
Splice S151			
Splice S172			
Splice S174			

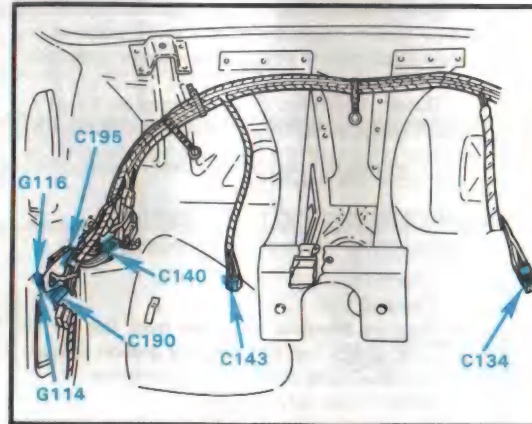


Figure 1—LH A-Pillar

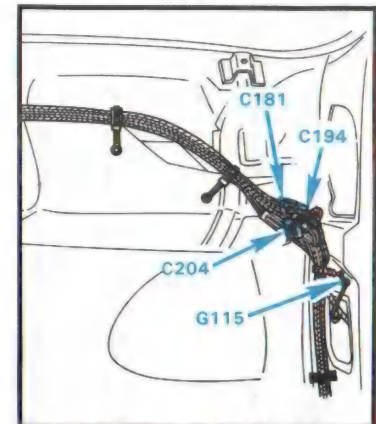
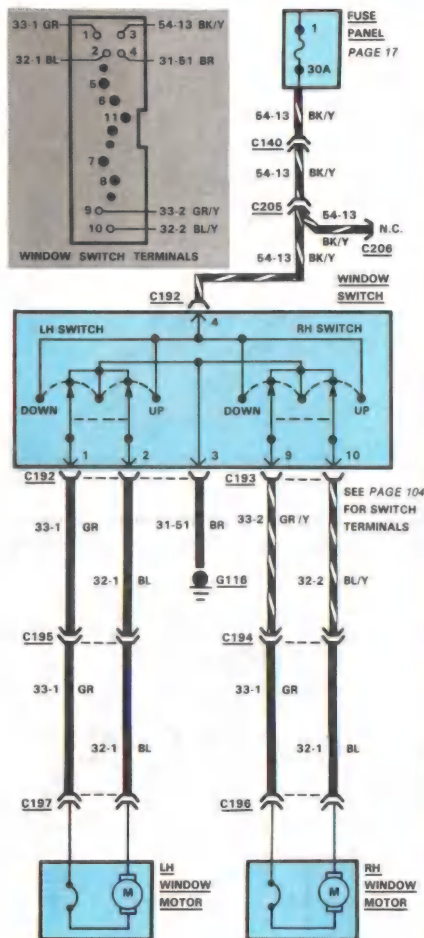


Figure 2—RH A-Pillar

68 POWER WINDOWS



COMPONENT LOCATION

		Page- Figure	Color	Terminals
Window Motors	In RH and LH doors respectively	68-2		
Window Switch	In console	68-1		
Connector C140	Behind LH side I/P	67-1	BK	2
Connector C192	At window switch	68-1	BK	6
Connector C193	At window switch	68-1	BK	5
Connector C194	At passenger side A-pillar	67-2		2
Connector C195	At driver side A-pillar	67-1		2
Connector C196	At RH power window motor			2
Connector C197	At LH power window motor	68-2		2
Ground G116	At driver side A-pillar			

HOW THE CIRCUIT WORKS

The switch in the center console sends current through the **Window Motor** in one direction for UP, and the opposite direction for DN.

In OFF position, both motor wires are grounded through separate switch contacts.

When the DN switch is pushed, power flows to the DN motor lead. The UP lead acts as ground.

When the UP switch is pushed, power flows to the UP motor lead. The DN lead acts as ground.

Each **Window Switch** directs power to its **Window Motor**, causing it to turn in a clockwise or counterclockwise direction to raise or lower the window.

Power Windows are protected by **Fuse 1**. Each motor assembly also has a circuit breaker to cut off power if a switch is held too long in the UP or DN position.

TROUBLESHOOTING HINTS

ONE/BOTH WINDOWS DO NOT WORK

- Check **Fuse 1**.
- Check **G116**.
- Remove **Window Switches** from floor console. Check for 12 volts and ground at connector. Check continuity of switches.
- Check continuity of wires.
- Remove **Window Motor** (read Shop Manual Section 42-07. Test as in Section 42-01).

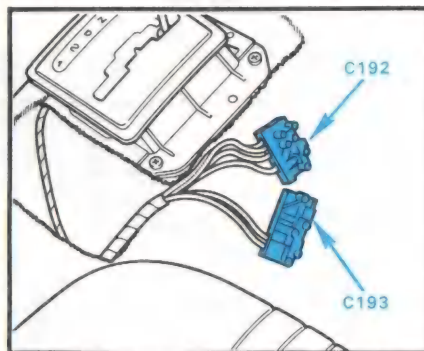


Figure 1—Power Window Switch Connectors

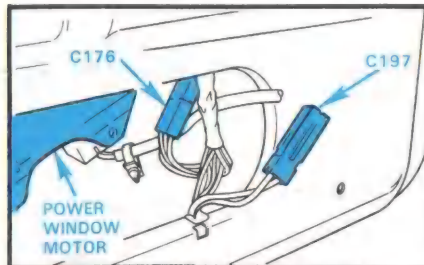
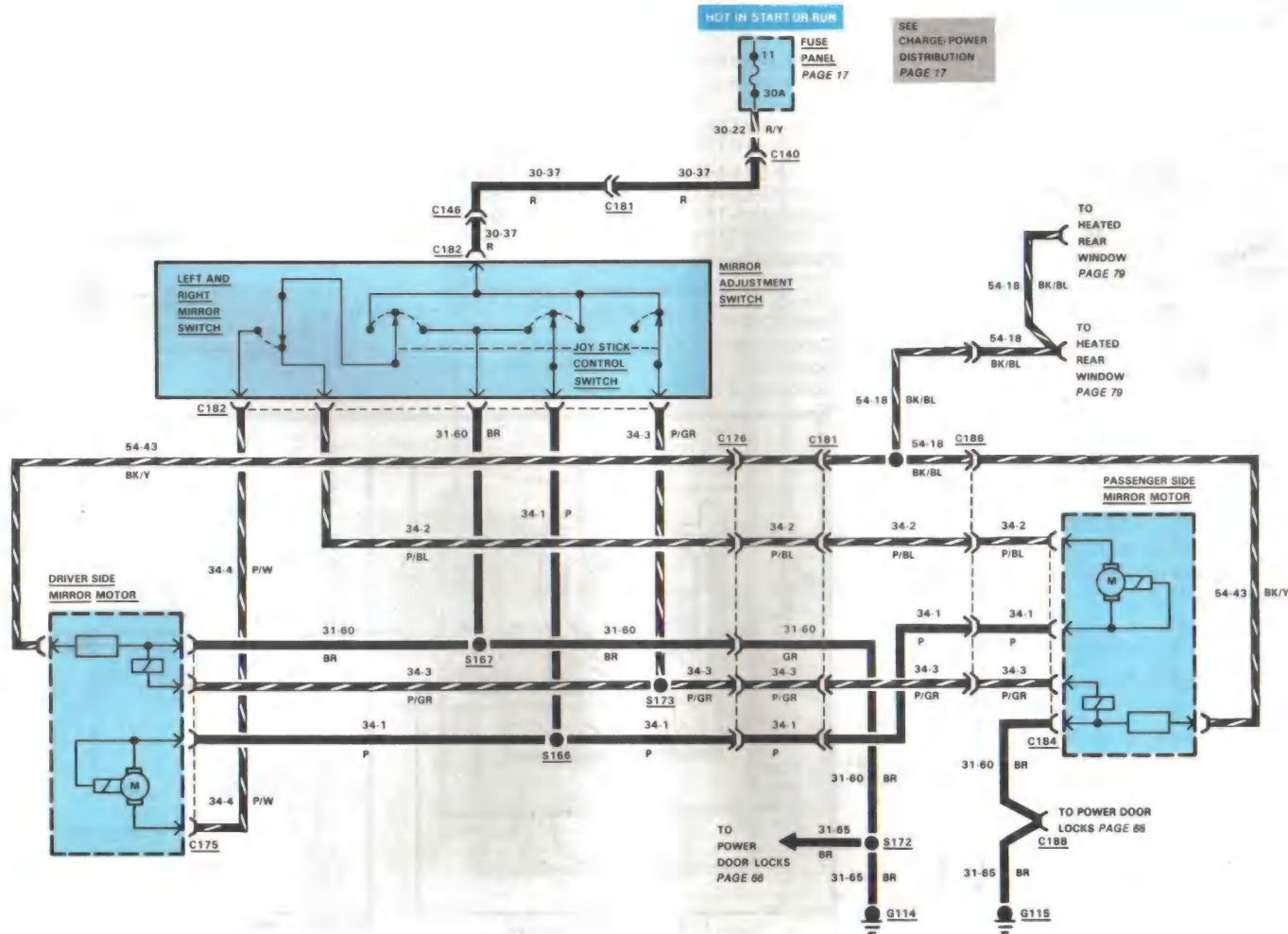


Figure 2—LH Door Shown—LH Typical



70 POWER MIRRORS

HOW THE CIRCUIT WORKS

Each **Power Mirror** is equipped with a motor, operated by a single joystick control switch. The joystick control switch controls both left and right (horizontal) and up and down (vertical) movement.

The left mirror-right mirror switch connects the joystick control to either the LH or RH **Power Mirror**.

TROUBLESHOOTING HINTS

BOTH MIRRORS DO NOT WORK

- Check **Fuse 11**.
- Remove driver's door trim panel. Check for voltage at **C146** in **circuit 30-37** using a known good ground.

If no power, check **circuit 30-37** back to fuse. If there is power, check **circuit 31-60** (BK wire) from **C182** to ground **G114**. If **circuit 31-60** is OK, check **Power Mirror Switch**.

ONE MIRROR DOES NOT WORK

- Check left mirror-right mirror switch.
- Check that in-line connectors are tight.

COMPONENT LOCATION

	Page- Figure	Color	Terminals
Mirror Adjustment Switch	70-1		
Mirror Motor			
Connector C140	67-1	BK	2
Connector C146		BK	1
Connector C175	70-2	BK	5
Connector C176	68-2	BK	5
Connector C181	67-2		5
Connector C182	70-1		6
Connector C184	70-2		5
Connector C186			4
Ground G114			
Ground G115	67-2		
Splice S166			
Splice S167			
Splice S172			
Splice S173			

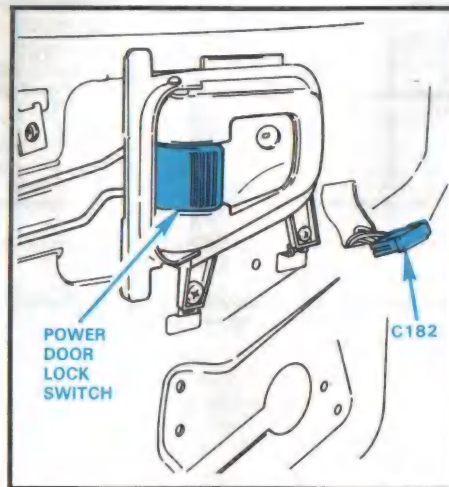
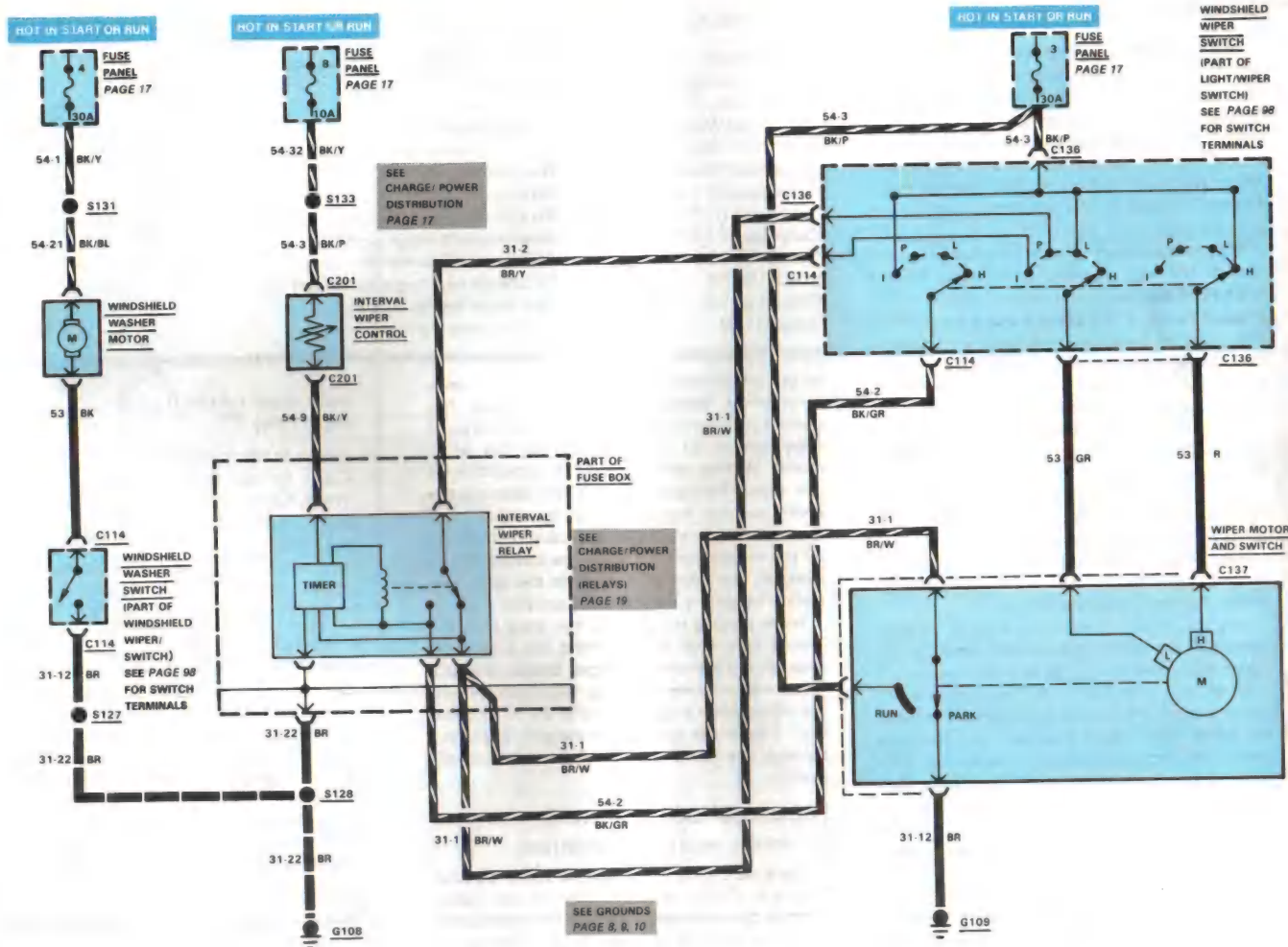


Figure 1 - Power Mirror Connector



Figure 2 - Power Mirror



72 WINDSHIELD WIPER/WASHER

HOW THE CIRCUIT WORKS

The **Interval Windshield Wiper/Washer** allows the driver to select LO speed, HI speed, or INTERVAL wipe. In INTERVAL, the wipes can be spaced five to twenty seconds apart.

The **Windshield Wiper/Washer Switch** has a momentary washer switch, and a two-position wiper switch. A variable resistor **Interval Wiper Control**, located in the instrument panel, sets interval time.

Washer Operation—Pushing the button on the end of the wiper/washer lever sends current from **Fuse 4** through the washer switch to the **Washer Pump**. If the **Wiper Switch** is in OFF or INT, interval override operates the electronic switch and governor relay to apply power to the L terminal of the wiper motor. The wipers operate in low speed. When the washer lever is released, extra wipe cycles are provided to dry the windshield. The wipers then return to OFF or INT operation.

LO (or HI) Speed Wiper Operation—When the wiper switch is in the LO (or HI) position, current flows from **Fuse 3** to the L terminal of the wiper motor. Power is applied to the H terminal of the wiper motor through the HI position of the wiper switch for high speed operation.

Interval Wiper Operation—During interval operation, the wipers make single wipes at low speed separated by a variable length pause.

When first switched to INT position, current flows through the wiper switch and to the **Interval Wiper Relay** which then activates the relay timer. The timer momentarily closes the electronic switch inside the **Interval Wiper Relay**. Current flows to the wiper motor L terminal through the energized contacts of the relay.

After the **Interval Wiper Relay** internal timer times out, the relay contacts open, and the wiper motor switch changes from the grounded PARK position to the hot RUN position. Current now flows through the **BR/W** wire, RUN contact

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Interval Wiper Control	On the instrument panel, below the tachometer	73-1		
Interval Wiper Relay	In fuse box			
Wiper Motor and Switch	LH side beneath cowl			
Windshield Wiper Switch	RH side of steering column	62-1		
Windshield Washer Motor	LH front fender apron, inside washer fluid reservoir			
Windshield Washer Switch	On end of windshield wiper lever	62-1		
Connector C114	RH side of steering column	67-1	BK	8
Connector C136	RH side of steering column	36-1	BK	4
Connector C137	At windshield wiper motor		BK	5
Connector C201	At interval wiper switch	73-1		6
Ground G108	LH side I/P near fog lamp switch T/O	13-3		
Ground G109	Near wiper motor			
Splice S128	LH side along frame			

of the wiper motor switch and resets the relay timer which opens the electronic switch. The current path continues through the de-energized relay contact to the L terminal of the wiper motor. Wiping continues to the completion of one wipe. The wiper motor switch returns to the PARK position contact, power is removed and the wiper motor stops. After a pause (controlled by the variable resistor inside the **Interval Wiper Control**), the relay timer pulls in the electronic switch inside the relay to start another wipe.

When parking is complete, the wiper motor is braked to a stop by grounding the L terminal through the **Windshield Wiper Switch** and the wiper motor switch. Braking takes place when the wiper motor switch moves to the PARK position. The wiper motor L terminal is grounded through the PARK contact of the wiper motor switch.

TROUBLESHOOTING HINTS

NO WIPERS IN INTERVAL POSITION

- Separate connector at **Interval Wiper Control** switch. Check at switch for varying resistance between **BK/P** and **BK/Y** wires while turning variable resistor. If bad, replace or

repair wiper switch. If good, replace **Interval Wiper Relay**.

WASHER PUMP DOESN'T WORK

- Check for low fluid level and for damaged hoses. Check **Fuse 4**.
- Disconnect plug at bottom of washer reservoir. Check for voltage on **BK/BL** wire, and for ground on **BK** wire with washer switch closed. Check pump motor, seal, and impeller assembly and replace if bad.

WIPERS DON'T WORK

- Check **Fuse 3**. If fuse blows again, check for short circuit to ground.

Separate **C136**. Carefully check for voltage at **BK/P** wire. If no voltage check for open in **R** wire from **Fuse 3**. If voltage is present, reconnect **C136** and disconnect **C137** and check for voltage at: **R** wire for HI operation. **GR** wire for LO operation.

If voltage is present check ground connection at wiper motor.

WIPERS RUN BUT DON'T PARK

- Perform "Parking Test—Non-Depressed Park" in Shop Manual Section 35-60.

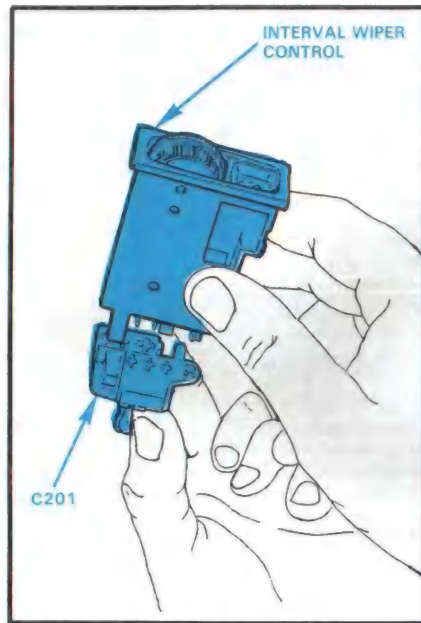
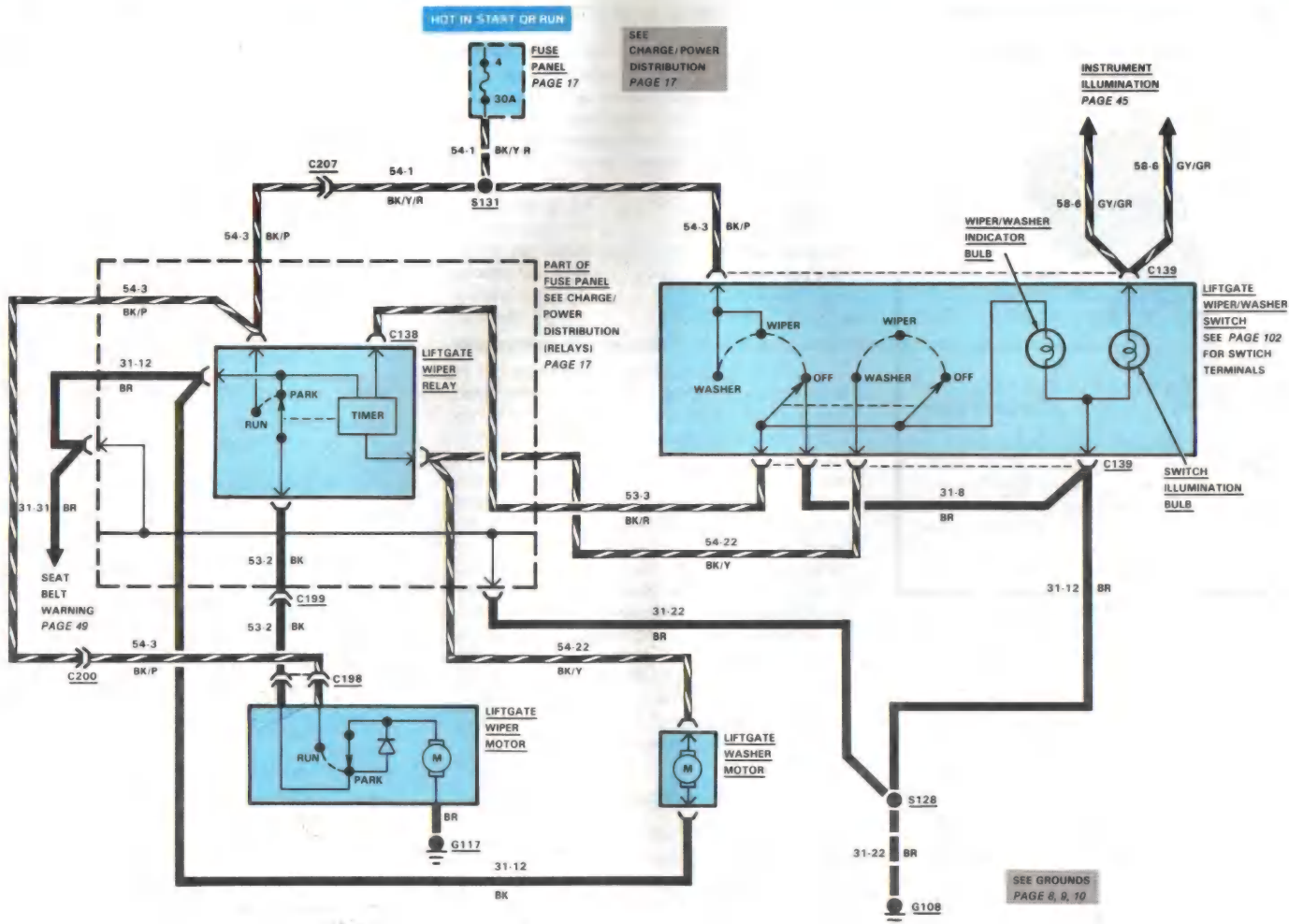


Figure 1—Interval Wiper Control Switch

74 LIFTGATE WIPER/WASHER



HOW THE CIRCUIT WORKS

With the **Ignition Switch** in START or RUN, power flows through **Fuse 4** and the **Liftgate** to operate the **Liftgate Wiper/Washer**.

Washer Operation

When the wiper/washer switch is depressed to its second position, the **Liftgate Washer Pump** motor is powered. The wiper operates when the washer switch is closed.

Wiper Operation

When the wiper/washer switch is depressed to its first position, current flows to the **Liftgate Wiper Relay**. The timer inside the **Liftgate Power Relay** is started and the contacts close, sending current to the RUN circuit of the **Liftgate Wiper Motor**. After a length of time, the timer opens the contacts inside the relay and current is sent to the PARK circuit of the **Liftgate Wiper Motor**. This cycle repeats itself until the **Liftgate Wiper/Washer Switch** is turned off.

TROUBLESHOOTING HINTS

WIPER DOESN'T WORK

- Check **Fuse 4**.
- Separate **C139**. Check for power on **BK/P** wire with ignition ON.
- Remove **Liftgate Wiper Relay** from **Fuse Panel**. Check for power on **BK/P** wire with ignition and wiper switch on. If power is missing, check wires back to wiper switch. Check for continuity to ground at **BR** wire.
- If continuity OK, test motor as described in Section 35-80 of the Shop Manual.

WASHER DOESN'T WORK

- Separate **C139** from **Liftgate Wiper/Washer Switch**. Check for continuity on **BK/Y** wire from **C139** to **Liftgate Washer Motor**.
- Check continuity of **BR** wire from **Liftgate Washer Motor** to **G108**.

COMPONENT LOCATION

		Page-Figure	Color	Terminals
Liftgate Washer Motor	In reservoir bottle at left side of reservoir			
Liftgate Wiper Motor	In liftgate	75-1		
Liftgate Wiper Relay	In fuse box			
Liftgate Wiper/Washer Switch	Left hand side of the I/P			
Connector C138	At liftgate wiper relay		0	7
Connector C139	At liftgate wiper/washer switch	80-1		6
Connector C198	At liftgate wiper motor	75-1		
Connector C199	In liftgate			
Connector C200	In liftgate			
Ground G108	RH side of I/P near the foglamp switch T/O	13-3		
Ground G117	At liftgate wiper motor	75-1		
Splice S128	LH side along frame			
Splice S131	Near liftgate switch T/O			

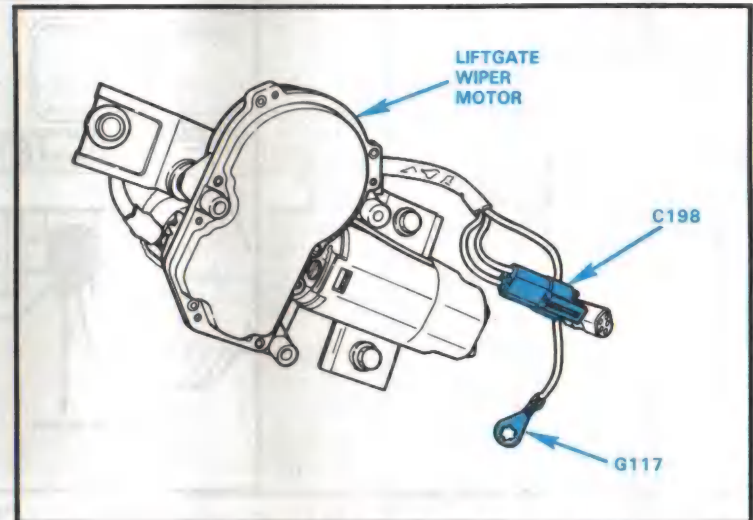
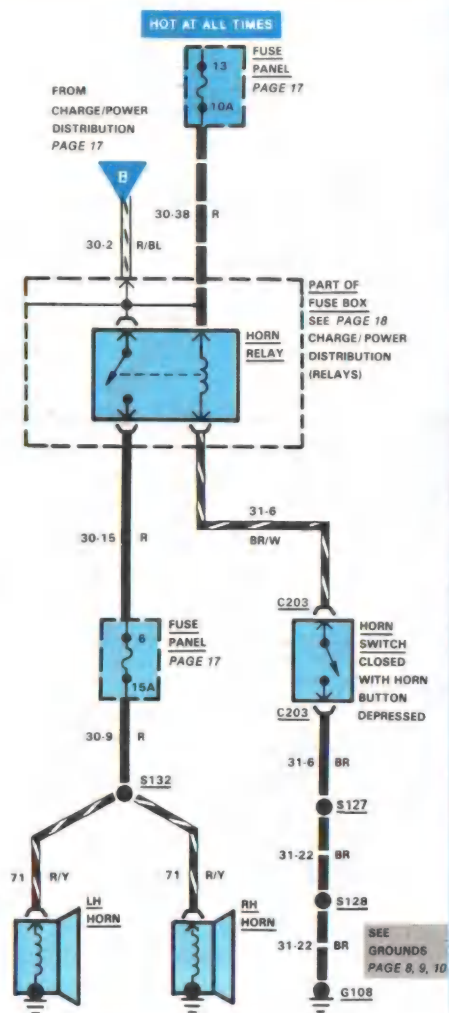


Figure 1—Liftgate Wiper Motor



COMPONENT LOCATION

		Page- Figure	Color	Terminals
Horns	At front RH and LH side of engine compartment	76-1		
Horn Relay	In fuse box			
Horn Switch	In steering wheel			
Connector C203	At horn switch	13-3		2
Ground G108	LH side I/P near foglamp switch T/O	13-3		
Splice S127	Behind center of I/P			
Splice S128	LH side along frame			
Splice S132	Near LH horn T/O			

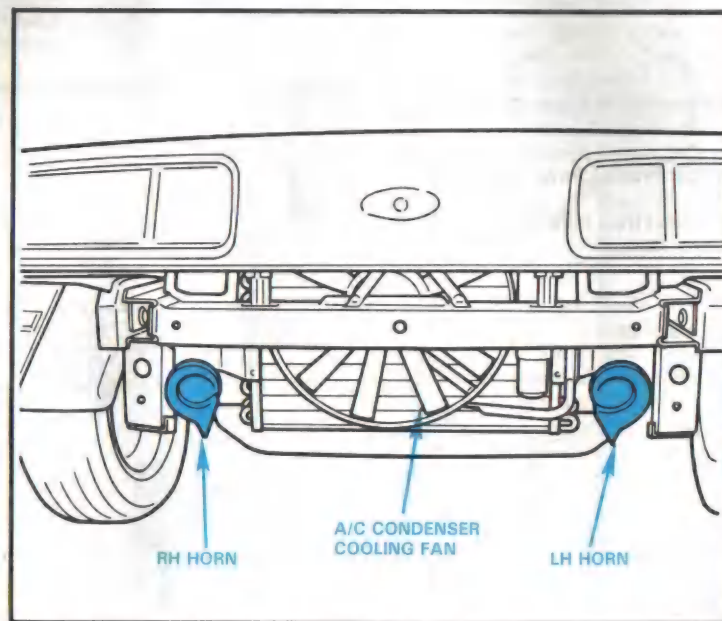
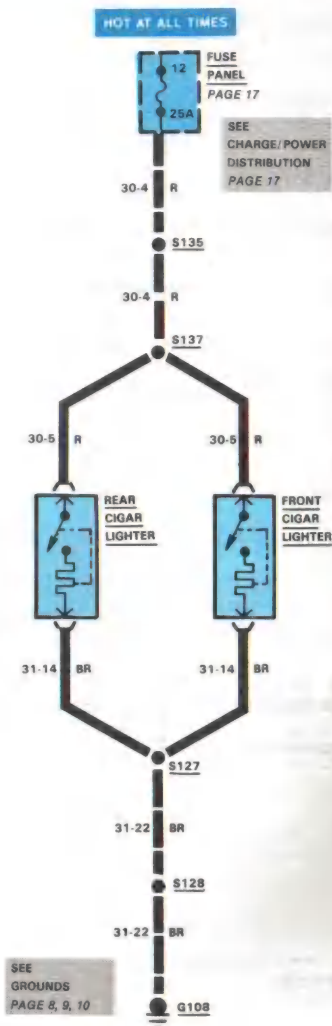


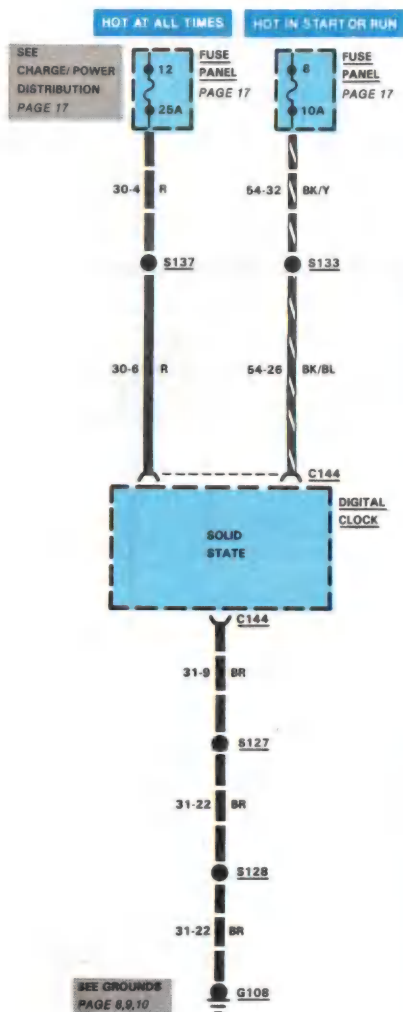
Figure 1—RH and LH Horns



COMPONENT LOCATION

Page-Figure	Color	Terminals
Front Cigar Lighter		On the I/P, below the speaker control joystick
Rear Cigar Lighter		On the back of the center console
Ground G108		LH side I/P near foglamp switch T/O 13-3
Splice S127		Behind center of I/P
Splice S128		LH side along frame
Splice S135		Along LH frame near door post
Splice S137		Behind center of I/P

78 DIGITAL CLOCK



COMPONENT LOCATION

		Page- Figure	Color	Terminals
Digital Clock	Center of I/P	62-7		
Connector C144	At digital clock			
Ground G108	LH side I/P near foglamp switch T/O	13-3	BK	4
Splice S127	Behind center of I/P			
Splice S128	LH side along frame			
Splice S133	Center of I/P, near tripmindr			
Splice S137	Behind center of I/P			



80 LIFTGATE DEFROST / HEATED MIRRORS

HOW THE CIRCUIT WORKS

When the **Liftgate Defrost Switch** is closed, current flows from **Fuse 2** to the **Liftgate Defrost Relay**. The **Defrost Relay** is energized, which closes the contacts and sends current to the **Liftgate Defrost Grid** and **Mirror Grids**. When the **Liftgate Defrost Switch** is opened, the relay is deenergized and the contacts open.

TROUBLESHOOTING HINTS

NO DEFROST OPERATION

- Check that relay operates when switch is turned ON and OFF.
- Check power on circuit **54-17 (BK wire)** at switch and relay.
- Check **Fuse 2**.

MIRRORS DO NOT HEAT UP

- If one mirror does not heat up, check circuit **54-43 (BK/Y wire)**.
- Check mirror heater element for continuity.
- Check for good ground (**G114** or **G115**).

Both mirrors are heated when **Liftgate Defrost Switch** is on.

COMPONENT LOCATION

	Page-Figure	Color	Terminals
Mirror Heater Grid	In the right and left side mirrors		
Liftgate Defrost Grid	In the liftgate window		
Liftgate Defrost Relay			
Liftgate Defrost Switch	On I/P, left of speedometer	62-1	
Connector C123	In liftgate, just right of latch		
Connector C175	At driver side power mirror motor	70-2	
Connector C176	Inside driver's door	87-1	
Connector C177	LH side I/P	80-1	
Connector C178	At liftgate defrost switch	80-1	
Connector C179	At liftgate defrost relay		
Connector C180	Behind center of I/P	87-1	
Connector C181	Near LH A-pillar	67-2	
Connector C184	At passenger side power mirror motor	70-2	
Connector C186	Near RH A-pillar		
Ground G106	In liftgate near rear window	12-2	
Ground G108	LH side I/P near foglamp switch T/O	13-3	
Ground G114	Near LH A-pillar		
Ground G115	Near RH A-pillar	67-2	
Splice S127	Behind center of I/P		
Splice S128	LH side along frame		
Splice S171	RH cowl panel		
Splice S172	Inside driver's door		

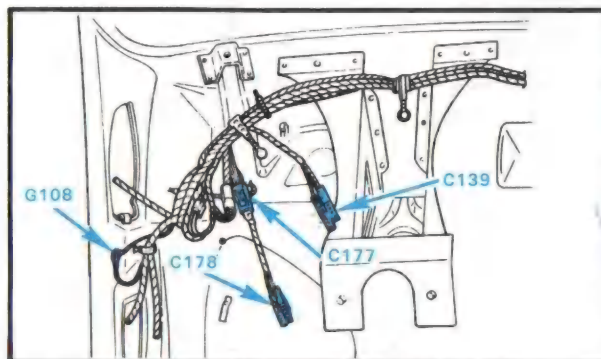
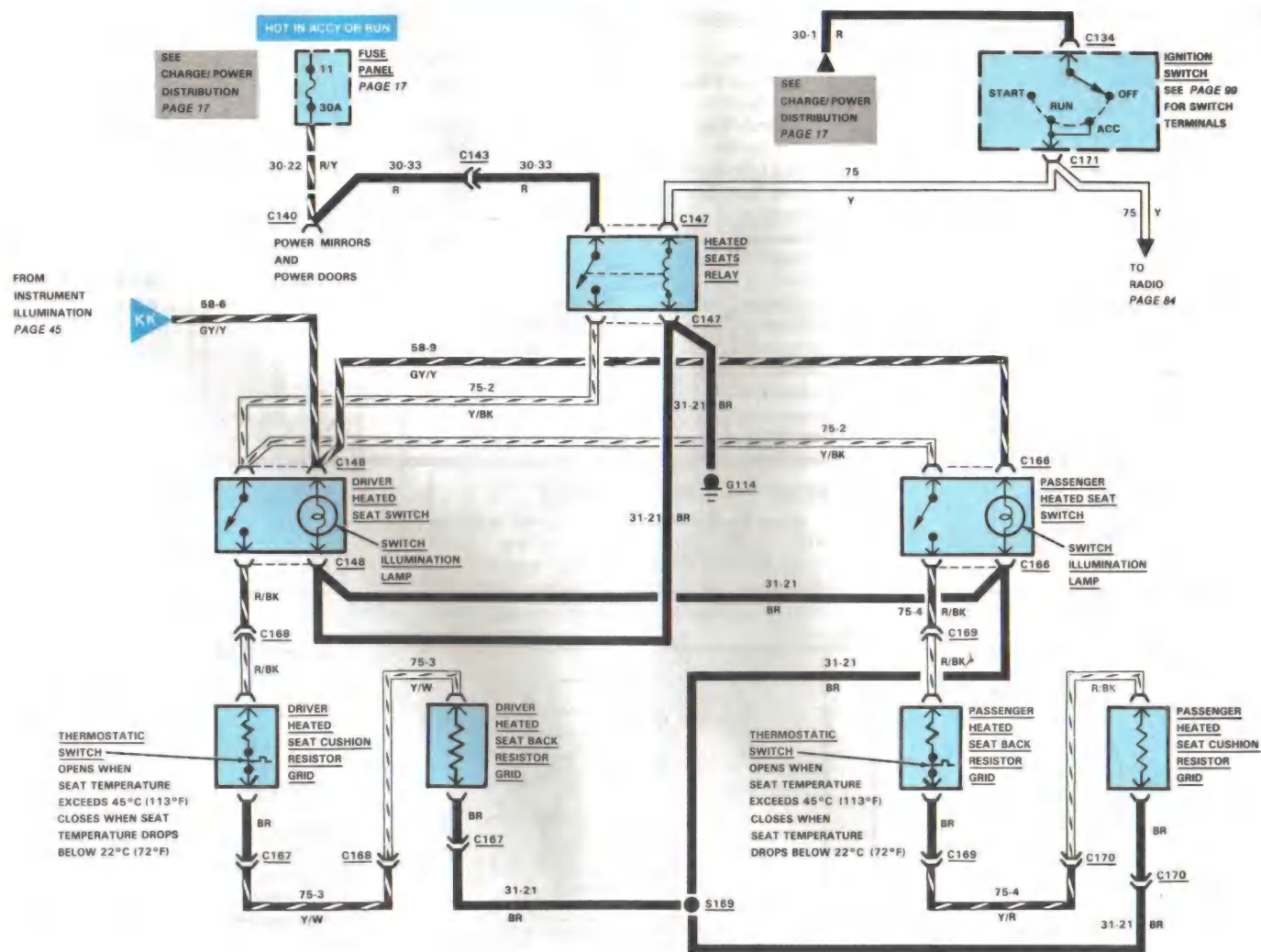


Figure 1 – LH I/P Wiring



82 HEATED SEATS

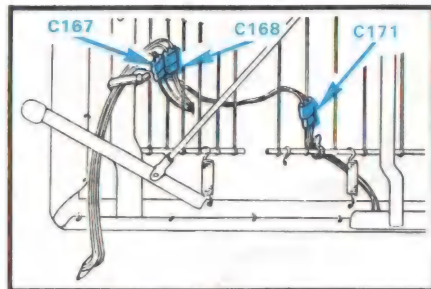


Figure 1—Drivers Seat Connectors

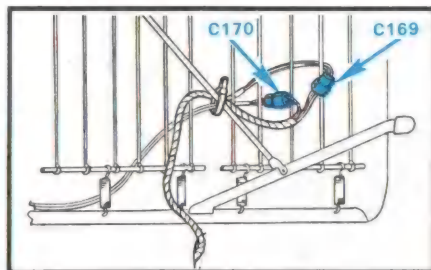


Figure 2—Passenger Seat Connectors

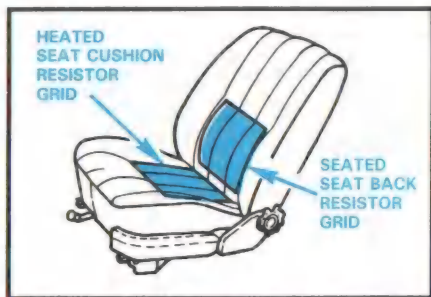


Figure 3—Heated Seats

COMPONENT LOCATION

		Page- Figure	Color	Terminals
Thermostatic Switch	Inside seat cushion	82-4		
Heated Seat Relay	In steering column support	36-1		
Ignition Switch				
Driver and Passenger Heated Seat Switch	Located on the right and left respectively of the center console	82-1,2		
Heated Seat Back Resistor				
Heated Seat Cushion Resistor	Behind lower center of I/P, near console	79-1	BK	2
Connector C147	At heated seats relay			4
Connector C148	At driver heated seat switch	83-5		4
Connector C166	At passenger heated seat switch	83-5		2
Connector C167	At driver seat back	82-1		2
Connector C168	At driver seat pad	82-1		2
Connector C169	At passenger seat pad	82-2		2
Connector C170	At passenger seat back	82-2		
Connector C171	At ignition switch	82-1		
Ground G114	Near LH A-pillar			
Splice S169				

HOW THE CIRCUIT WORKS

When the **Ignition Switch** is turned to Run or ACC position, current flows to the **Heated Seats Relay** and energizes the relay coil and closes the relay contacts. Current then flows from **Fuse 11** to the **Driver and Passenger Heat-**

ed Seat Switches, when switch is turned on, current flows to the **Resistor Grids** located in the seat back and seat pad. A **Thermostatic Switch** located in each seat pad, opens when seat temperature reaches 45°C (113°F), and closes when it drops below 22°C (72°F).

TROUBLESHOOTING HINTS

NEITHER HEATED SEAT WORKS

- Check for voltage at Y wire at **Heated Seats Relay**.
- Check that **G114** is clean and tight.
- With ignition in Run or ACC, check for voltage at Y/BK wire of **C148**.

ONE HEATED SEAT DOESN'T WORK

- Check for voltage at Y/BK wire of affected seat switch.
- Check **Thermostatic Switch** in seat pad. (Refer to Shop Manual for Testing Procedure.)

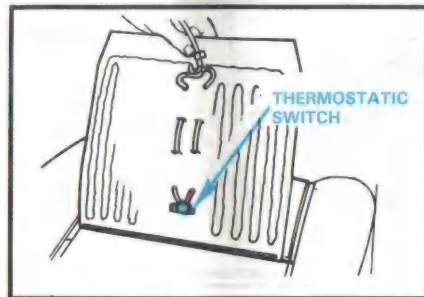


Figure 4—Heated Seats Thermostatic Switch

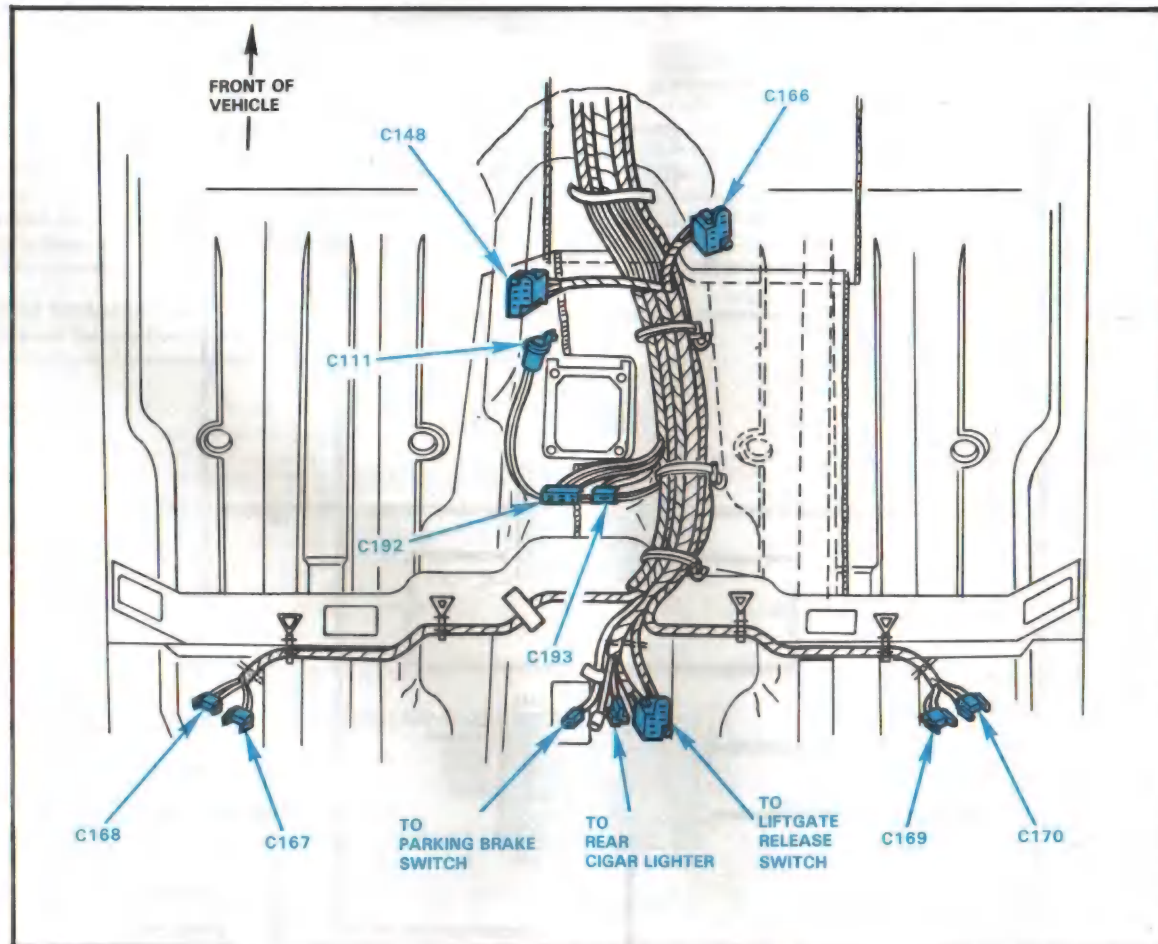
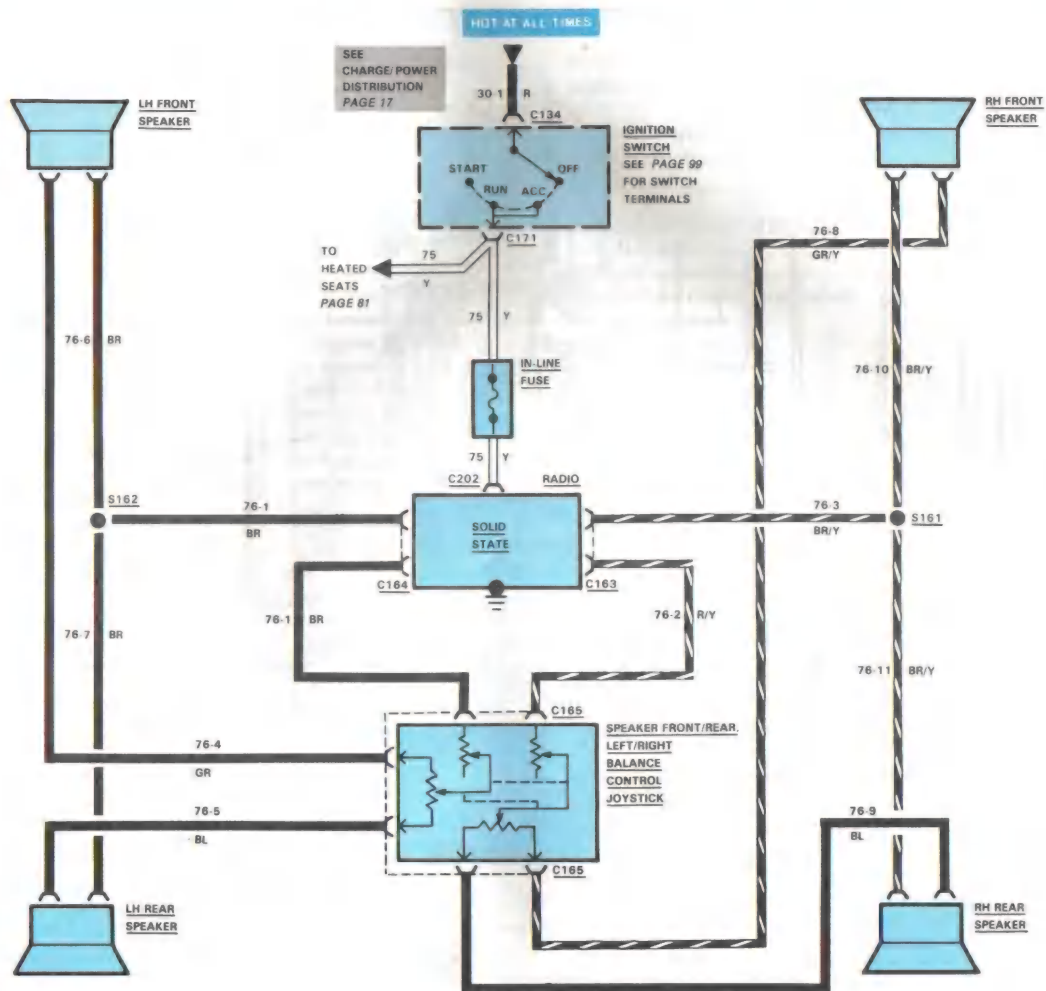


Figure 5—Console and Heated Seats Wiring

84 RADIO



HOW THE CIRCUIT WORKS

The **Radio** receiver current directly from the **Ignition Switch**. An **In-Line Fuse** protects the circuit. A **Speaker Balance Control Joystick** then directs current to any or all speakers.

TROUBLESHOOTING HINTS

RADIO DOESN'T WORK

- Check **In-Line fuse**
- Check for voltage at **Y** at **Radio**.
- Check radio chassis ground connection.

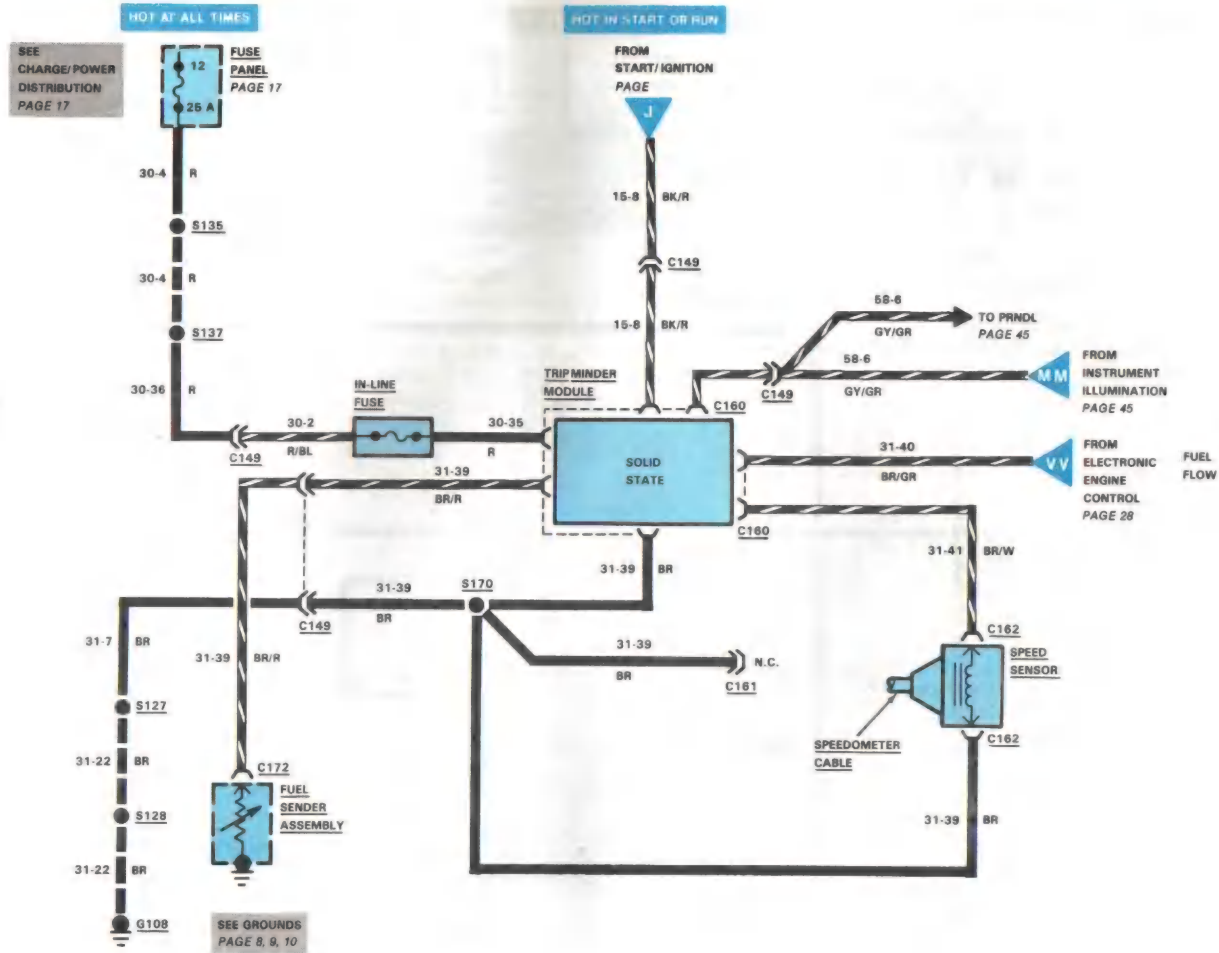
ONE OR MORE SPEAKERS DON'T WORK

- Check **Speaker Balance Control Joystick**.
- Check continuity to speaker at **C165**.

COMPONENT LOCATION

	Page- Figure	Color	Terminals
Ignition Switch	On steering column		
Front Speakers	In either side of the I/P	62-1	
Rear Speakers	In either side of the rear quarter trim panel		
Speaker Balance Control Joystick	In center of I/P	62-1	
Connector C163	At radio		2
Connector C164	At radio		2
Connector C165	At speaker balance control joystick		6
Connector C202	At radio		1
Splice S161			
Splice S162			

86 TRIPMINDER



HOW THE CIRCUIT WORKS

The **Tripminder** is contained in one module. Readout signals are displayed on the **Tripminder** screen.

The **Message Center** receives inputs from the **Speed Sensor**; **Fuel Sender Assembly** and the **Electronic Control Assembly**. Power to the **Tripminder** is through **Fuse 12**. An **In-Line Fuse** also protects the circuit.

Refer to Shop Manual Section 33-86 for complete operating instructions.

TROUBLESHOOTING HINTS

The **Message Center** includes a **Field Diagnostics** capability to isolate malfunctions in the system.

Refer to Section 33-86 in the Shop Manual for a complete description of the **Field Diagnostic** procedure.

QUICK CHECK

- Check **Courtesy Lamp** operation. If OK, check **In-Line Fuse**. If not OK, check **Fuse 12**.
- Check connection in wiring circuits.
- If the **Tripminder** displays an unusually large or small **distance-to-empty** number relative to the amount of fuel left in the tank, disconnect all power from the **Tripminder** for a few minutes. Then, reconnect power and reset the **Tripminder** functions.

CAUTION

Do not use a test lamp in troubleshooting the **Tripminder**. See **Diagnosis and Testing** in the 1985 Shop Manual.

COMPONENT LOCATION

Tripminder Display

Page-Figure	Color	Terminals
87-2		
87-1	BK	5
87-1	BR	14
	BL	1
13-3		2

Module	Behind center of I/P	
Fuel Sender Assembly	In fuel tank	87-2
Speed Sensor	In engine compartment, near dash panel	
Connector C149	Behind center of I/P	87-1
Connector C160	At tripminder module	87-1
Connector C161	Behind center of I/P	
Connector C162	At speed sensor	
Ground G108	LH side I/P near foglamp switch	13-3
Splice S127	Behind center of I/P	
Splice S128	LH side along frame	
Splice S135	Along LH frame, near door post	
Splice S137	Behind center of I/P	
Splice S170	Behind center of I/P	

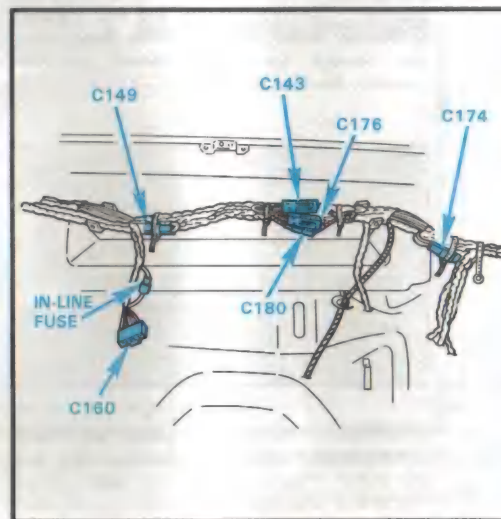


Figure 1—Instrument Panel Wiring— Tripminder

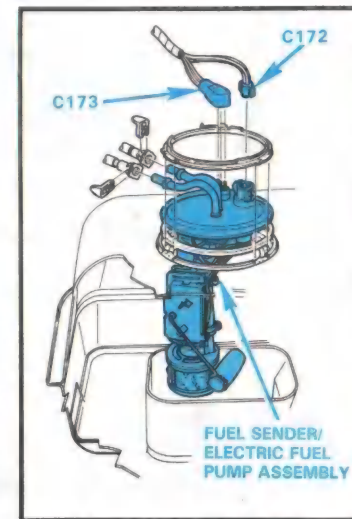
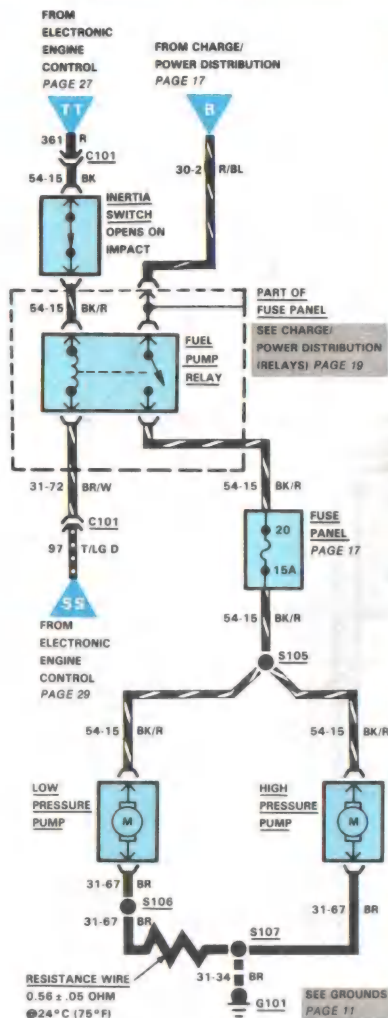


Figure 2—Fuel Sender Assembly

88 FUEL PUMP CONTROL



COMPONENT LOCATION

	Page-Figure	Color	Terminals
Fuel Pump Relay	88-1		
Inertia Switch			
In-Line Fuse			
High Pressure Fuel Pump			
Low Pressure Fuel Pump	87-2		
Connector C101	34-4	GY	2
Splice S105			
Splice S106			
Splice S107			
Ground G101			

HOW THE CIRCUIT WORKS

Current to operate the Fuel Pumps flows through Fuse Link B. When controlled by the Electronic Control Assembly, and with the Inertia Switch closed, the Fuel Pump Relay operates through the Inertia Switch, applying power to the Fuel Pumps.

NOTE

If engine does not operate after collision, it is possible that Inertia Switch has opened. Switch can be reset by putting finger through hole on RH side of trunk trim liner, and pushing down on white reset plunger.

Current to the Low Pressure Fuel Pump passes through a ballast Resistance Wire, and this pump, mounted in the fuel tank, pumps fuel at low pressure. Fuel pressure is boosted by the High Pressure Fuel Pump, which is mounted to the frame rail.

TROUBLESHOOTING HINTS

FUEL PUMP DOESN'T OPERATE

- Check Fuse Link B.
- Check that G101 is clean and tight.
- Check operation of Fuel Pump Relay.
- Check continuity through Inertia Switch.

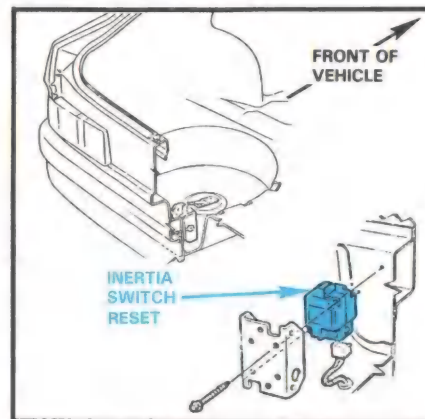
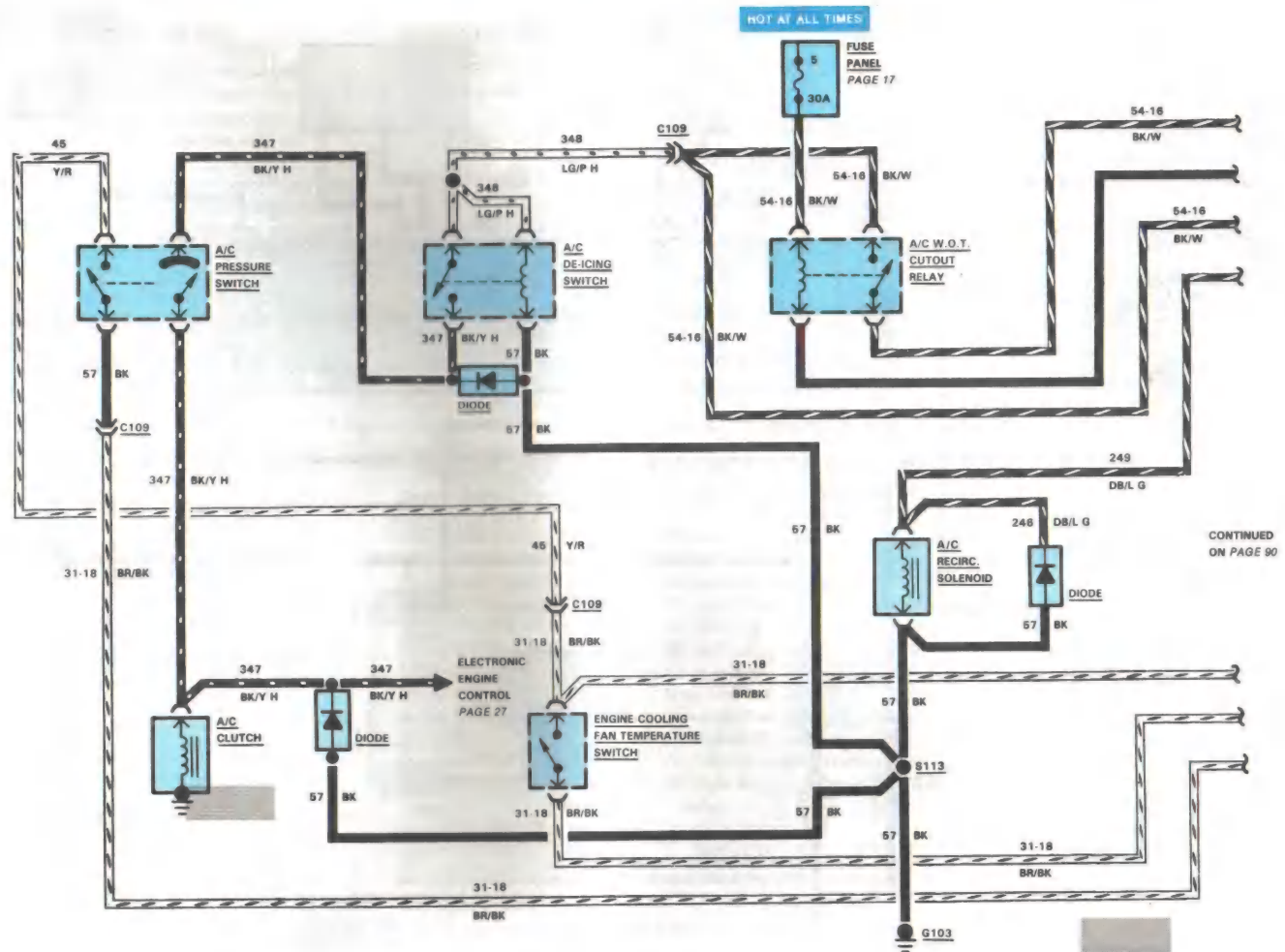
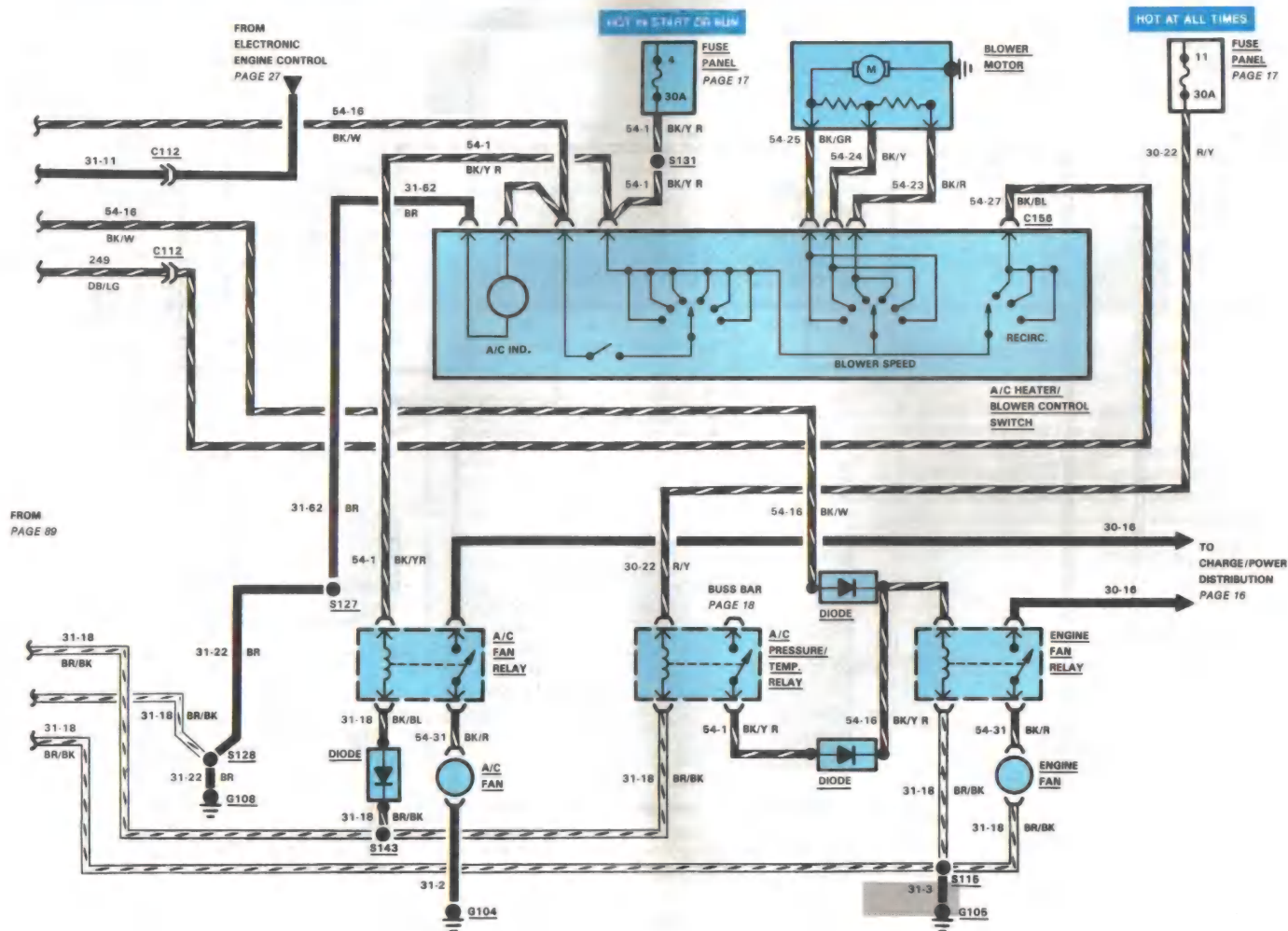


Figure 1 — Inertia Switch





HOW THE CIRCUIT WORKS

Pushing the rotary switch once automatically illuminates a green A/C indicator lamp and sends current to the **A/C Compressor Clutch Circuit**. A second push turns the A/C off.

Rotating the switch clockwise over the three blower speed positions directs outside air into the vehicle. Rotating the switch counterclockwise, also over the three positions, circulates recirculated air around the vehicle interior.

COMPONENT LOCATION

		Page- Figure	Color	Terminals
A/C Clutch Field Coil	At A/C compressor			
A/C Compressor Clutch Relay	In fuse box			
A/C Condenser Cooling Fan	In front of condenser	92-3		
A/C Condenser Cooling Fan Relay	In fuse box			
A/C Deicing Switch	At A/C condenser			
A/C Heater Blower Control Switch	Center of I/P, left of radio	92-4		
A/C Pressure Switch	On top of receiver/dryer	92-1		
A/C Solenoid	RH fender apron near battery	33-2		
A/C W. O. T. Cutout Relay	RH front fender apron			
Engine Cooling Fan	Between radiator and engine	92-3		
Engine Cooling Fan Relay				
Engine Cooling Fan Temperature Switch	LH side of engine on lower intake manifold			
Heater Blower Motor	Inside the evaporator case	92-2		
Connector C109	Near windshield washer bottle		Nat	2
Connector C112	Behind RH side of I/P	34-4	WH	2
Connector C145	LH front engine compartment		GY	5
Connector C156	At heater blower switch		BK	8
Splice S113	RH front of engine compartment			
Splice S115	LH side engine compartment			
Splice S127	Behind center of I/P			
Splice S128	LH side along frame			
Splice S131	Near wiper switch T/O			
Splice S143	Behind LH side of I/P			
Splice S151	Center of I/P, near tripminder			
Ground G103	RH front of engine compartment			
Ground G104	RH side engine compartment near parking lamp			
Ground G105	Near LH flasher T/O	12-1		
Ground G108	LH side I/P near foglamp switch T/O	13-3		

92 A/C-HEATER/COOLING FAN

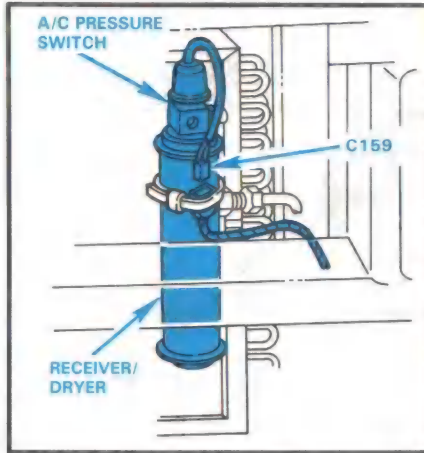


Figure 1—A/C Pressure Switch

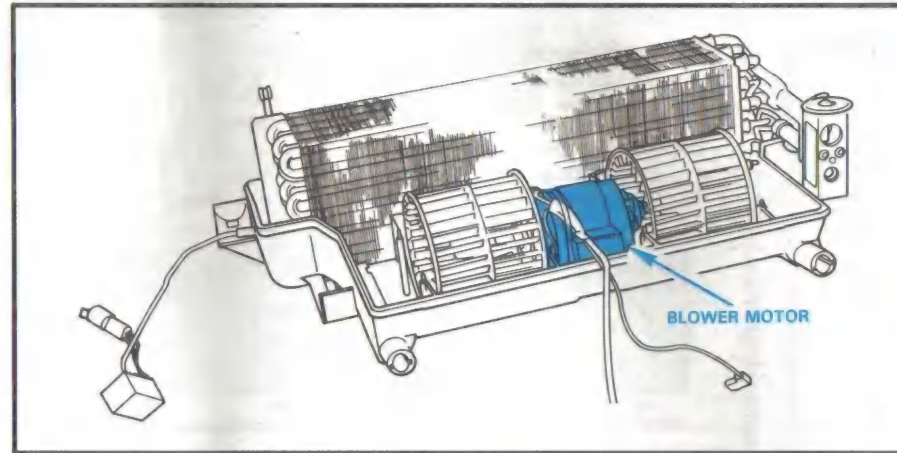


Figure 2—Blower Motor

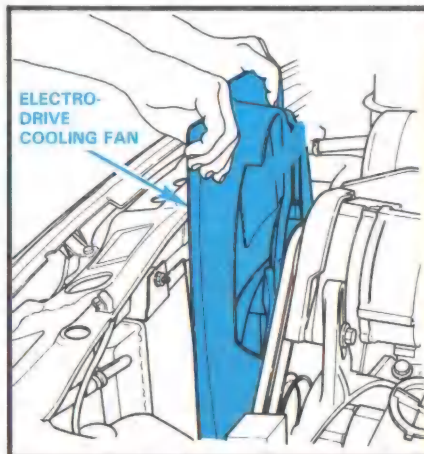


Figure 3—Electro-Drive Cooling Fan

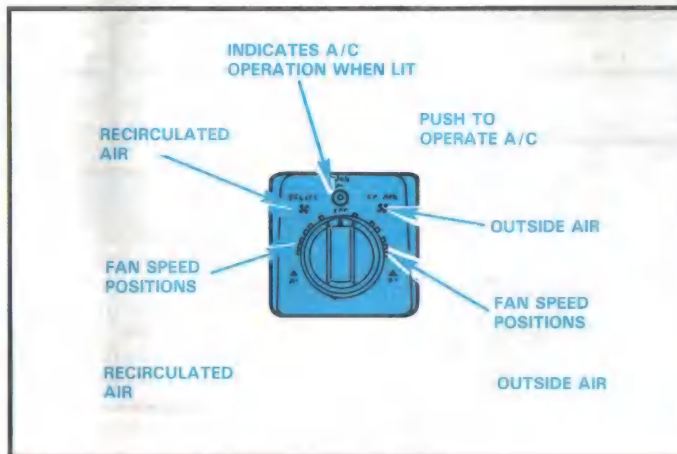
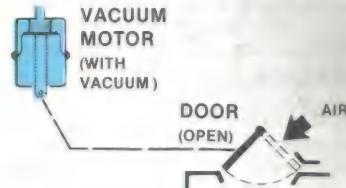


Figure 4—Blower Switch



"T" JUNCTION



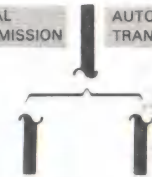
VACUUM ON VACUUM MOTOR
PULLS DOOR OPEN TO
LET AIR PASS THROUGH

FROM
VACUUM
DISTRIBUTION



"CUT" HOSES
REFERENCED
BETWEEN PAGES
ARROW SHOWS
VACUUM FLOW
FROM MANIFOLD
FITTING TO
COMPONENT

MANUAL
TRANSMISSION



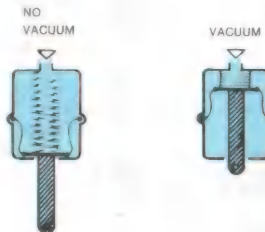
ALTERNATE
VACUUM
PATHS

NOTE

Other vacuum symbols used on
vacuum system diagrams are fully ex-
plained on those pages.

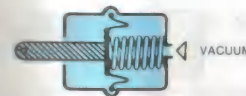
VACUUM MOTOR OPERATIONS

SINGLE DIAPHRAGM MOTOR



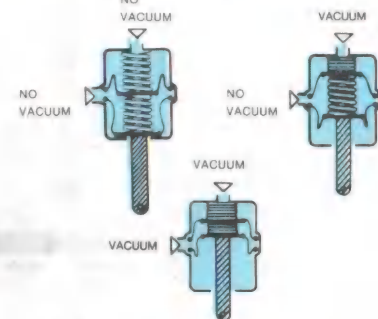
Vacuum motors operate like electrical solenoids, mechanically pushing or pulling a shaft between two fixed positions. When vacuum is applied, the shaft is pulled in. When no vacuum is applied, the shaft is pushed all the way out by a spring.

SERVO MOTOR



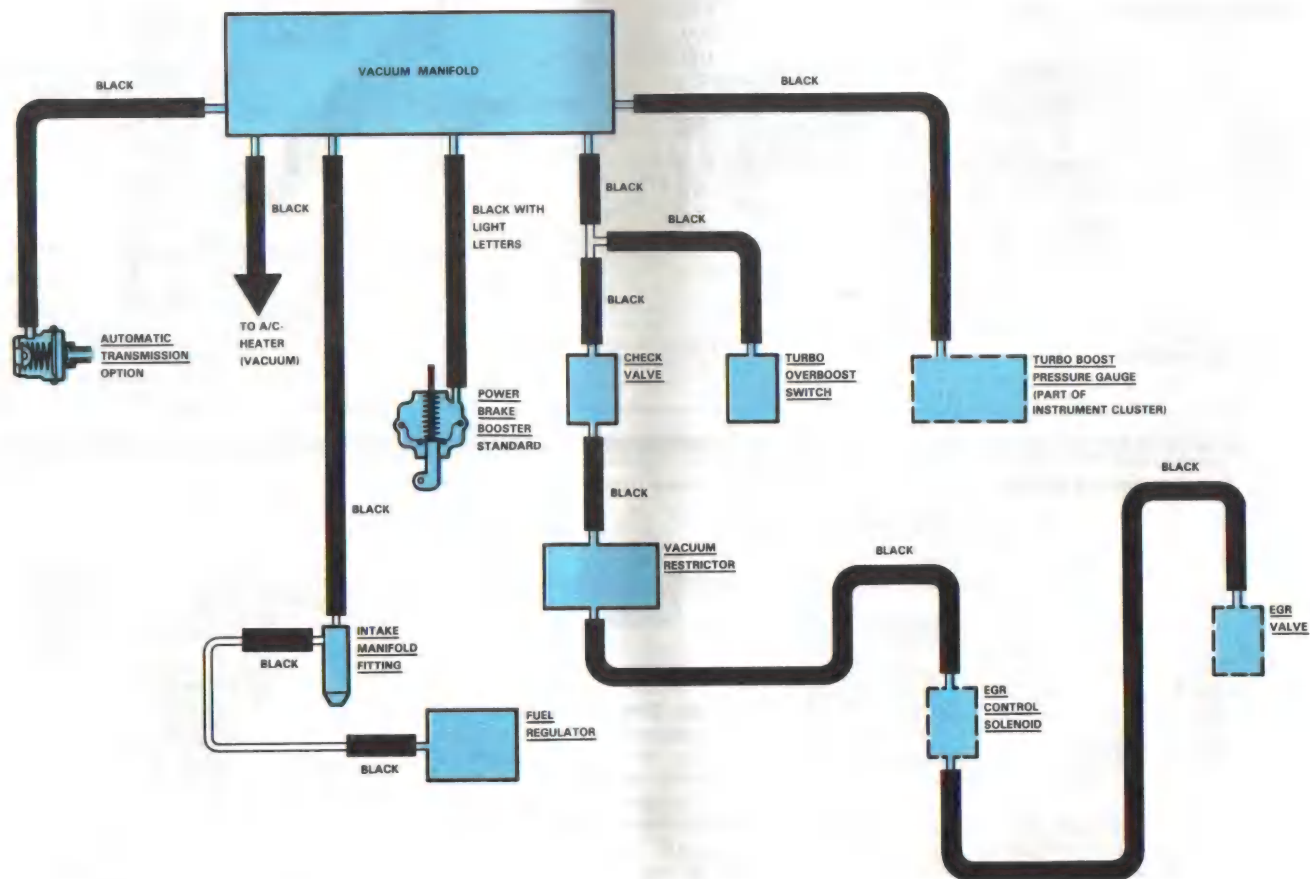
Some vacuum motors such as the **Servo Motor** in the **Speed Control** can position the actuating arm at any position between fully extended and fully retracted. The **Servo** is operated by a control valve that applies varying amounts of vacuum to the motor. The higher the vacuum level, the greater retraction of the motor arm. **Servo** motors work exactly the same as the two-position motors; the only difference is in the way the vacuum is applied. **Servo Motors** are generally larger and provide a calibrated control.

DOUBLE DIAPHRAGM MOTOR



A double diaphragm motor has three positions, it is really two motors in one housing. When the top port gets vacuum, the shaft pulls half-way in. When both ports get vacuum, the shaft pulls all the way in.

94 VACUUM DISTRIBUTION



TROUBLESHOOTING HINTS

These six steps present an orderly method of troubleshooting:

Step 1. Verify the problem.

- Operate the complete system and see all symptoms for yourself in order to:
 - check the accuracy and completeness of the customer's complaint.
 - learn more that might give a clue to the nature and location of the problem.

Step 2. Narrow the problem.

- Using this manual, narrow down the possible causes and locations of the problem in order to more quickly find the exact cause.

Step 3. Test the cause.

- Use test procedures to find the specific cause of the symptoms.

Step 4. Verify the cause.

- Confirm the fact that you have found the correct cause through operating the parts of the circuit you think are good.

Step 5. Make the repair.

- Repair or replace the faulty component.

Step 6. Verify the repair.

- Operate the system as in Step 1 and check that your repair has removed all symptoms, and also has not caused any new symptoms.

TROUBLESHOOTING TESTS

NOTE

Vacuum system problems fall into three groups:

1. Leaks in hoses, connectors, or motor diaphragms.
2. Pinched Lines or Clogged Valves.
3. Faulty mechanical operation of parts driven by vacuum motors.

Vacuum Supply Test

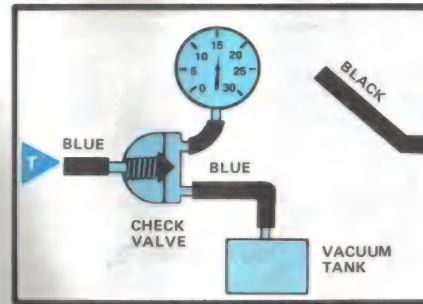


Figure 1 — System Supply Test

1. Connect **Vacuum Tester** to system side of **Check Valve** (Figure 1).
2. Start engine. Gage should show approximately 15" of vacuum.
3. Turn off engine. Watch gage.
 - If vacuum holds, supply OK.
 - If vacuum fails, replace **Check Valve** or **Tank**.

Leak Test

1. Connect **Vacuum Gage** and **Vacuum Pump** (Figure 3) to system hose in place of tank.
2. Open valve and start pump. Operate controls in all modes.
3. Listen for hiss, watch gage.

NOTE

Hissing is normal at Function Control when changing modes.

If system hisses or loses vacuum, find system leak as follows:

1. Turn on **Vacuum Pump** and check for vacuum build-up.

2. Stop pump, vacuum should drop.
3. Clamp supply hoses with needle-nose pliers one at a time until vacuum stops dropping (Figure 3).
4. Check vacuum schematic to find components in that line.
5. Clamp hoses through circuit to find leak.

Component Test

1. Connect **Vacuum Tester** (Figure 2) to component.
2. Pump **Vacuum Tester** and check that component operates correctly and vacuum holds.
3. Replace component if vacuum doesn't hold.

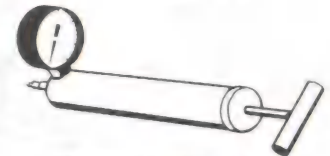


Figure 2 — Vacuum Tester

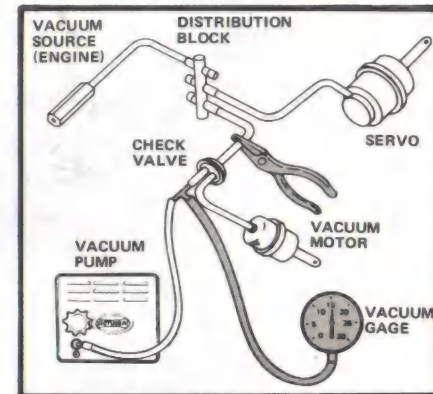


Figure 3 — Testing For Leak In Typical Vacuum System

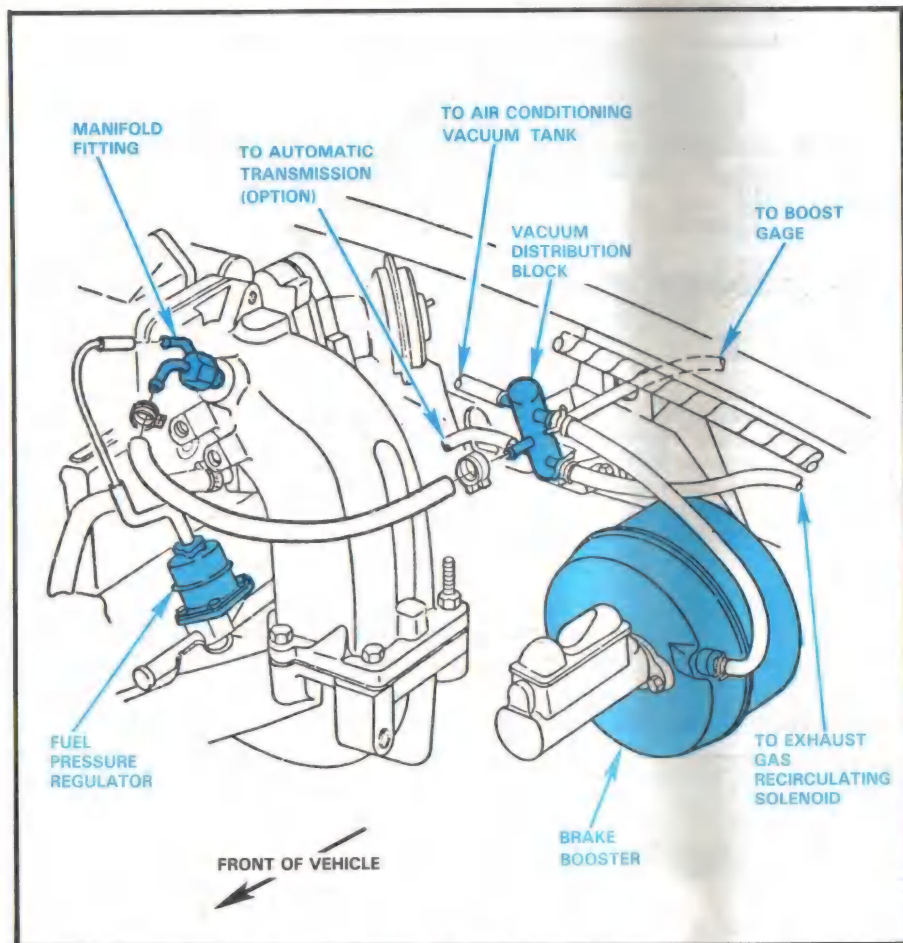


Figure 4—Vacuum Distribution Block Connections

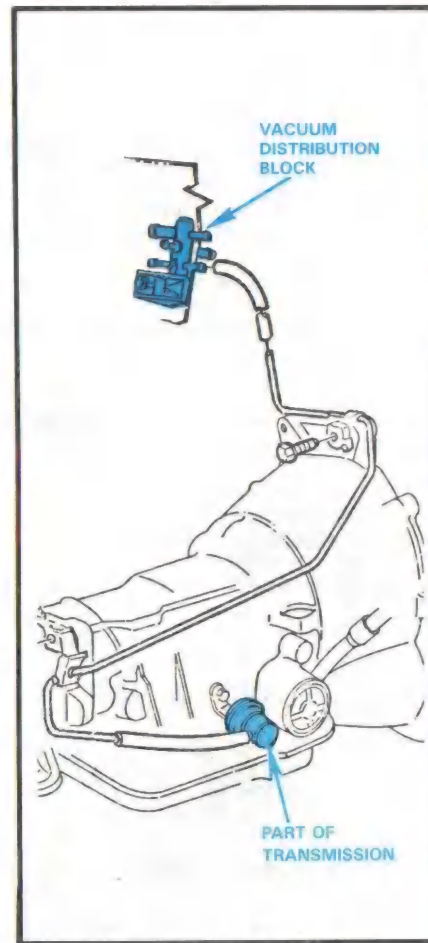


Figure 5—Vacuum Distribution
—Automatic Transmission

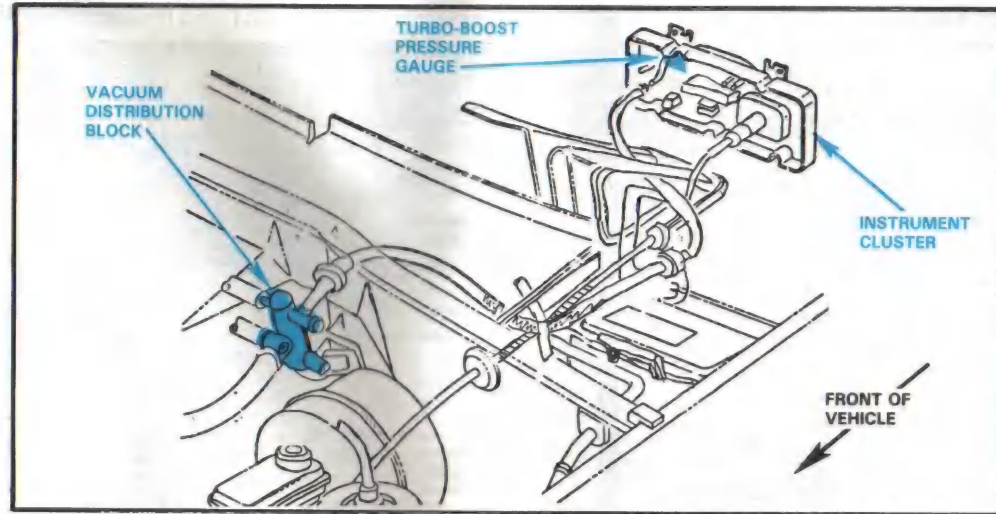


Figure 6 – Turbo-Boost Pressure Gauge

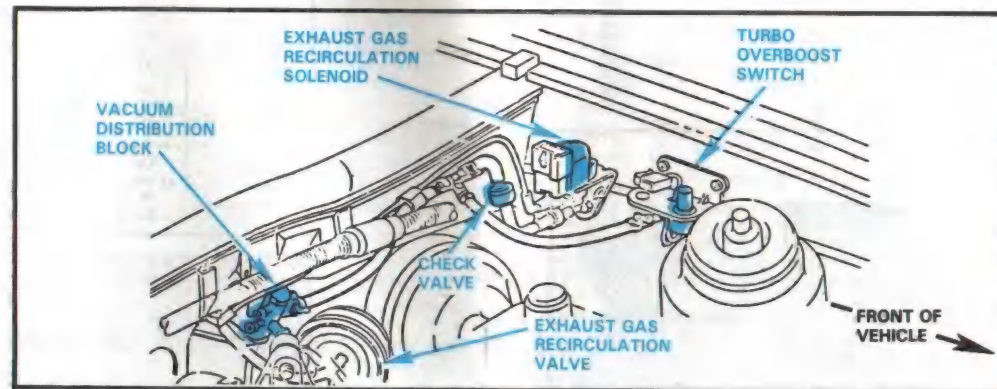


Figure 7 – EGR Vacuum Distribution

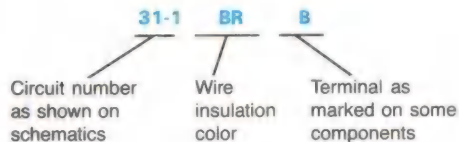
98 COMPONENT TESTING: HEADLAMP/WIPER SWITCH

INTRODUCTION

Component testing procedures are provided to prove that a component is good or bad.

Testing information for each component includes a schematic component terminal locations and step-by-step test procedures. Component terminals are identified:

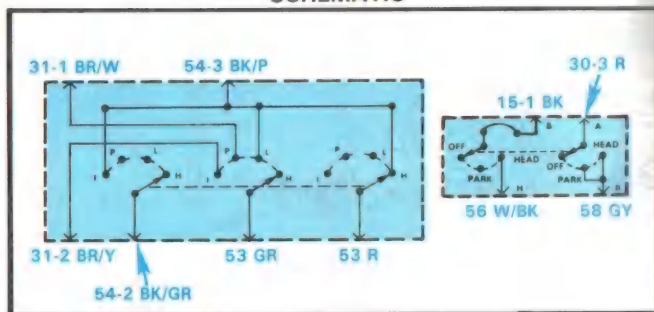
1. by the circuit number of the wires that connect to that terminal;
2. by the wire insulation color;
3. by letters or numbers which may be marked on the component.



The component connector **MUST BE REMOVED** before testing. To test a single circuit within the component, select that circuit under the column **TO TEST**. If you wish to test the complete component, perform all tests.

Connect the tester to the terminals shown in the second column and operate the component as shown in the third column.

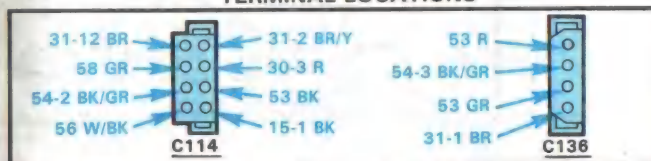
SCHEMATIC



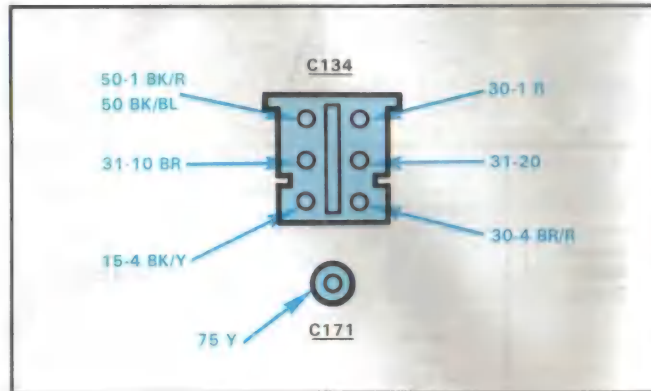
COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Headlight Circuit	56 W/BK and 15-1 BK	Off Open Circuit Park Open Circuit Head Closed Circuit	
Park Light Circuit	58 GY and 30-3 R	Off Open Circuit Park Closed Circuit Head Closed Circuit	
Wiper Switch Circuit	54-3 BK/P and 53 GR	Off Open Circuit Lo Closed Circuit Hi Open Circuit Int Open Circuit	
	54-3 BK/P and 53 R	Off Open Circuit Lo Open Circuit Hi Closed Circuit Int Open Circuit	
	54-3 BK/P and 54-2 BK/GR	Off Open Circuit Lo Open Circuit Hi Open Circuit Int Closed Circuit	
Interval Wiper Circuit	31-2 BR/Y and 53 GR	Off Open Circuit Lo Open Circuit Hi Open Circuit Int Closed Circuit	
	54-3 B/P and 54-2 BK/GR	Off Open Circuit Lo Open Circuit Hi Open Circuit Int Closed Circuit	

TERMINAL LOCATIONS



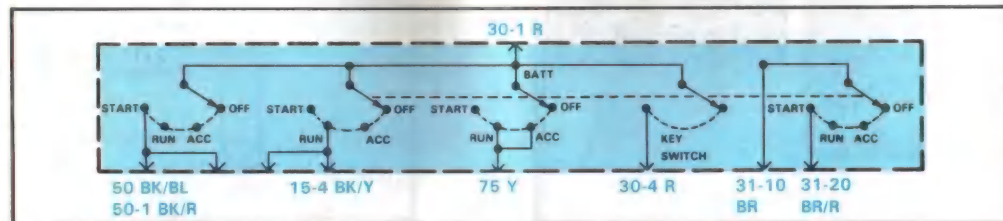
TERMINAL LOCATIONS



COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Key to These Positions	A Good Switch Will Indicate
"Acc" Circuit	30-1 R and 75 Y	Off, Acc, Run, Start	Closed Circuit in Acc and Run positions
Starter Relay Switch Circuit	30-1 R and 50 BK/BL, 50-1 BK/R	Off, Acc, Run, Start	Closed Circuit in Start position only
Ignition Switch Circuit	30-1 R and 15-4 BK/Y	Off, Acc, Run, Start	Closed Circuit in Run and Start positions.
Dual Warning Buzzer	30-1 R and 30-4 R	Off, Acc, Run, Start	Closed Circuit in Start position only
Circuit Bulb Test Circuit	31-10 BR and 31-20 BR/R	Off, Acc, Run, Start	Closed Circuit in Start position only

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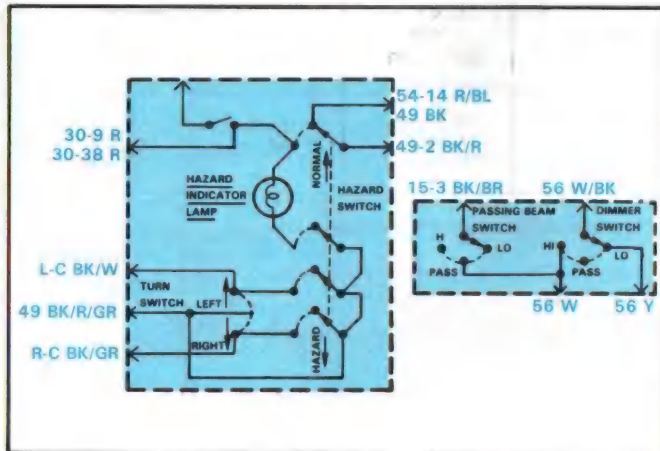


100 COMPONENT TESTING: MULTI-FUNCTION SWITCH

COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Turn Switch Circuit	49 BK/R/GR and L-C BK/W	Turn Switch to Turn Left	Closed Circuit
	49 BK/R/GR and R-C BK/GR	Turn Switch to Turn Right	Closed Circuit
	49 BK and 49-2 BK/R	Hazard Switch to Normal	Closed Circuit

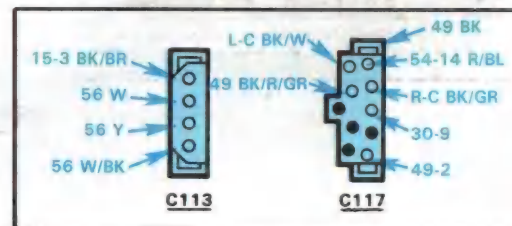
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COMPONENT TESTING PROCEDURE

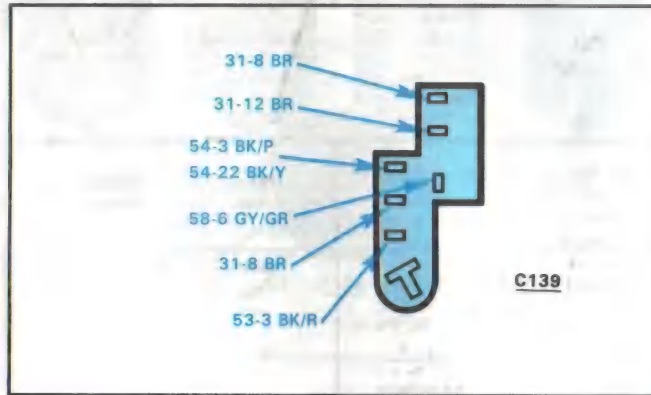
TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Hazard Switch Circuit	30-9 R and 49-2 BK/R	Hazard	Closed Circuit
	30-9 R and L-C BK/W	Hazard	Closed Circuit
	30-9 R and R-C BK/GR	Hazard	Closed Circuit
Passing Beam and Dimmer Switch Circuit	15-3 BK/BR and 56W	Pull 1/2 way up	Closed Circuit
	56 W/BK and 56W	Pull up and Release	Closed Circuit only when switch is in HI position
	56 W/BK and 56 Y	Pull up and Release	Closed Circuit only when switch is in Lo position

TERMINAL LOCATIONS

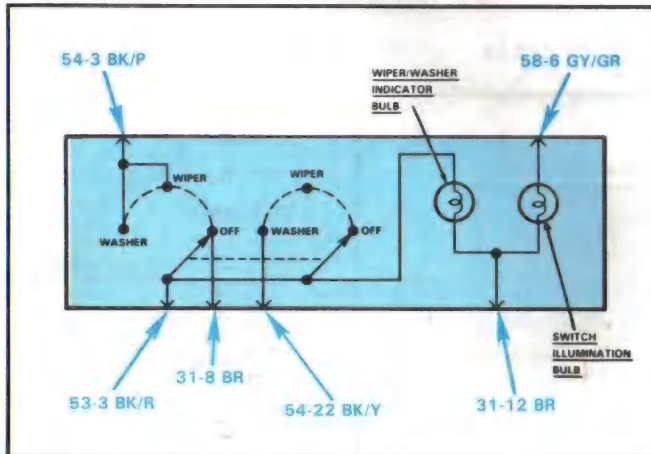


COMPONENT TESTING: LIFTGATE WIPER / WASHER SWITCH 101

TERMINAL LOCATIONS



SCHEMATIC

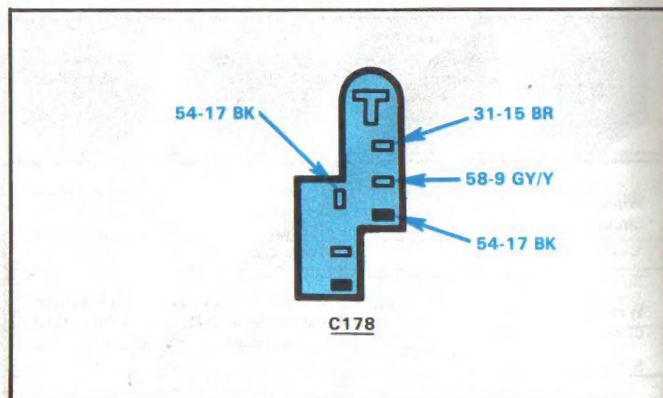


COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Knob to These Positions	A Good Switch Will Indicate
Wiper Circuit	54-3 BK/P and 53-3 BK/R	Off Open Circuit Wiper Closed Circuit Washer Closed Circuit	
Washer Circuit	54-3 BK/P and 54-22 BK/Y	Off Open Circuit Wiper Open Circuit Washer Closed Circuit	
Park Circuit	53-3 BK/R and 31-8 BR	Off Closed Circuit Wiper Open Circuit Washer Open Circuit	
Wiper/ Washer Indicator Bulb Circuit	53-3 BK/R and 31-12 BR	All Closed Circuit	
Switch Illumination Bulb Circuit	58-6 GY/GR and 31-12 BR	All Closed Circuit	

102 COMPONENT TESTING: LIFTGATE DEFROST/HEATED MIRROR SWITCH

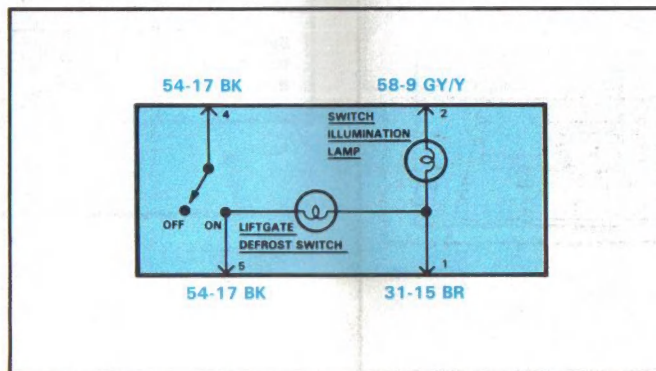
TERMINAL LOCATIONS



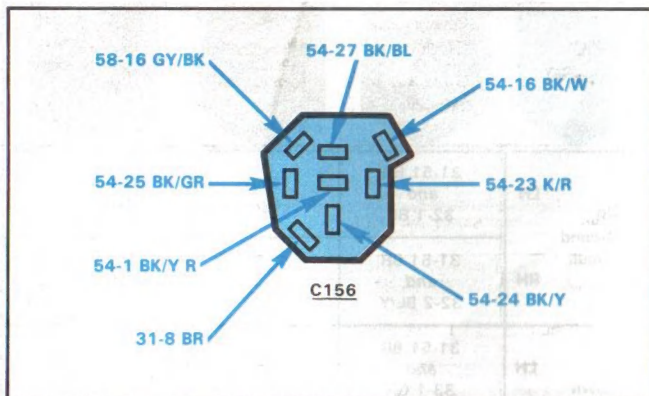
COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
ON, Off Switch Circuit	54-17 BK (Pin 4) and 54-17 BK (Pin 5)		On Closed Circuit Off Open Circuit
Defrost Indicator Lamp Circuit	31-15 BR and 54-17 BK (Pin 4)		On Closed Circuit Off Open Circuit
Switch Illumination Lamp Circuit	58-9 GY/Y and 31-15 BR		Any Closed Circuit

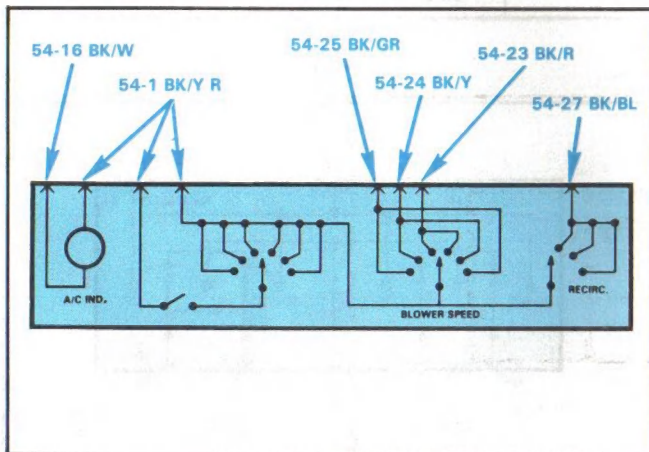
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TERMINAL LOCATION



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COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Control to These Positions	A Good Switch Will Indicate
Blower Low Speed Switch Circuit	54-1 BK/Y R and 54-23 BK/R	Off Open Circuit Low (CW CCW) Closed Circuit Medium (CW CCW) Open Circuit High (CW CCW) Open Circuit	
Blower Medium Speed Switch Circuit	54-1 BK/Y R and 54-24 BK/Y	Off Open Circuit Low (CW CCW) Open Circuit Medium (CW CCW) Closed Circuit High (CW CCW) Open Circuit	
Blower High Speed Switch Circuit	54-1 BK/Y R and 54-25 BK/GR	Off Open Circuit Low (CW CCW) Open Circuit Medium (CW CCW) Open Circuit High (CW CCW) Closed Circuit	
A/C Push Button Switch Circuit	54-1 BK/Y R and 54-16 BK/W	On Closed Circuit Off Open Circuit	
Recirc. Switch Circuit	54-1 BK/Y R and 54-27 BK/BL	Off Open Circuit Low (CCW) Closed Circuit Medium (CCW) Closed Circuit High (CCW) Closed Circuit Low (CW) Open Circuit Medium (CW) Open Circuit High (CW) Open Circuit	

104 COMPONENT TESTING: POWER WINDOW SWITCH

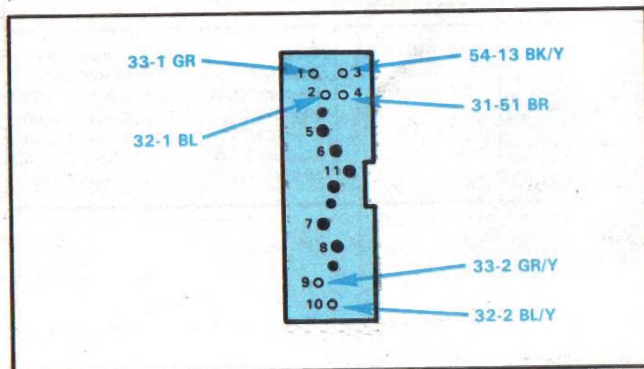
COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Up Power Circuit	LH 54-13 BK/Y and 32-1 BL	Down Open Circuit Up Closed Circuit	
	RH 54-13 BK/Y and 32-2 BL/Y	Down Open Circuit Up Closed Circuit	
Down Panel Circuit	LH 54-13 BK/Y and 33-1 GR	Down Closed Circuit Up Open Circuit	
	RH 54-13 BK/Y and 33-2 GR/Y	Down Closed Circuit Up Open Circuit	

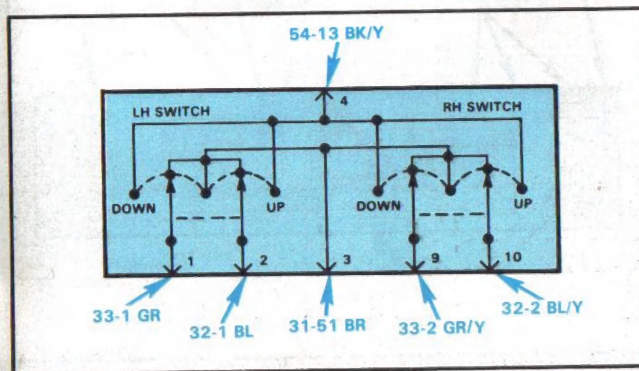
COMPONENT TESTING PROCEDURE

TO TEST	Connect Self Powered Test Light or Ohmmeter to Terminals	Move Switch to These Positions	A Good Switch Will Indicate
Up Ground Circuit	LH 31-51 BR and 32-1 BL	Down Closed Circuit Up Open Circuit	
	RH 31-51 BR and 32-2 BL/Y	Down Closed Circuit Up Open Circuit	
Down Ground Circuit	LH 31-51 BR and 33-1 GR	Down Open Circuit Up Closed Circuit	
	RH 31-51 BR and 33-2 GR/Y	Down Open Circuit Up Closed Circuit	

TERMINAL LOCATIONS



SCHEMATIC





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